



- Final -

ENVIRONMENTAL ASSESSMENT

FOR MINUTEMAN III MODIFICATION

Prepared for:

ICBM System Program Office
Ogden Air Logistics Center
Hill Air Force Base, UT



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14. ABSTRACT This Environmental Assessment documents the potential environmental impacts of: (1) Minuteman III missile flight tests using modified Reentry System (RS) hardware/software, in addition to the continuation of Force Development Evaluation flight tests; (2) deployment of new and modified RS hardware/software; and (3) deployment activities for new command and control console equipment. The locations covered in this EA include: FE Warren Air Force Base (AFB), WY; Hill AFB, UT; Malmstrom AFB, MT; Minot AFB, ND; Vandenberg AFB, CA; and US Army Kwajalein Atoll, Republic of the Marshall Islands.						
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FINDING OF NO SIGNIFICANT IMPACT (FONSI)

ENVIRONMENTAL ASSESSMENT FOR MINUTEMAN III MODIFICATION

Agency: United States Air Force (USAF)

Background: Pursuant to the provisions of the National Environmental Policy Act (NEPA) of 1969, Executive Order 12114, Council on Environmental Quality (CEQ) Regulations [40 Code of Federal Regulations (CFR) Parts 1500-1508], 32 CFR Part 989, and the US Army Kwajalein Atoll Environmental Standards (UES), the USAF has conducted an assessment of the potential environmental consequences of the testing and deployment activities associated with proposed modifications to the Minuteman (MM) III Intercontinental Ballistic Missile (ICBM) system. The assessment focused on those activities that have the potential to change the human and natural environments.

The United States has historically relied on the concept of deterrence to maintain peace. Because the MM III will become the only land-based ICBM system in America's nuclear arsenal, the Department of Defense (DOD) is extending the life of the existing force of MM III ICBMs through the year 2020. As a life-extension action, the proposed modifications involve reconfiguration of the MM III missile Reentry System (RS) to be capable of carrying the Mark 21 reentry vehicle (RV) and warhead—currently deployed on Peacekeeper ICBM missiles undergoing deactivation—as well as the existing Mark 12A RV. The newer and more capable Mark 21 RVs will replace the older Mark 12 RVs now deployed on MM IIIs, thus enhancing nuclear safety and improving the future reliability of the weapon system. The proposed modifications will require testing and deployment of system hardware/software, equipment, and trainers needed to incorporate Mark 21 RVs onto missiles at any of the MM Launch Facilities (LFs) located within the three MM Wings (FE Warren AFB, Wyoming; Malmstrom AFB, Montana; and Minot AFB, North Dakota).

In conjunction with the RS modification and deployment of Mark 21 RVs, upgrade and replacement of electronic command and control console equipment, and software, is also needed at all Launch Control Centers (LCCs) located within the three MM Wings, and at other USAF and contractor trainer/test facilities supporting MM III ICBM operations. The planned console equipment upgrades are needed to resolve a variety of software deficiencies and aging hardware failures. The upgrades will also implement changes to the console operations software required for deployment of the Mark 21 RVs. All of the proposed MM III modifications are needed for continued nuclear deterrence and improved safety and reliability of the weapon system, and to compensate for the deactivation of Peacekeeper missiles.

The Environmental Assessment (EA) considers all potential impacts of the Proposed Action and the No Action Alternative. This Finding of No Significant Impact (FONSI) summarizes the results of the evaluations of the proposed activities associated with the proposed MM III modification.

Proposed Action and No Action Alternative: The EA assesses the environmental impacts of the proposed testing and deployment activities associated with the proposed MM III modification. During the test and evaluation phase, MM III missile flight tests, utilizing the modified RS, will originate from Vandenberg AFB, California. The MM boosters used in the flight tests will be pulled from operational LFs randomly selected at the Wings. The LFs will then receive replacement boosters provided by the rocket motor depot maintenance facility at Hill AFB, Utah.

At Vandenberg AFB, the missile launches will occur from existing silos that are regularly used for these types of tests. On each test missile, the operational RVs are replaced with one to three RV simulators. At the terminal end of each missile flight, the test RVs will impact near the US Army Kwajalein Atoll (USAKA) in the Republic of the Marshall Islands (RMI). Test RVs containing high explosives would be detonated at some altitude (airburst), or upon impact on land or water. RVs that do not contain high explosives will remain intact as they impact land or water at high velocities. In addition to the ongoing three to four MM III Force Development Evaluation flight tests conducted every year, two additional flight tests per year will occur in Fiscal Years 2005 and 2006.

During the deployment phase for RS modifications at the Wings, efforts will include the distribution of new and modified hardware for mounting the Mark 21 RVs onto MM IIIs, new electronic flight equipment, changes to command and launch equipment, new support equipment, new and modified software, and modifications to personnel training hardware. RS-related test and support equipment at both Hill and Vandenberg AFBs will also be modified accordingly. Deployment of the RS modification kits and Mark 21 RVs at the three MM Wings will begin in 2006 and continue through 2011.

For the new command and control console equipment, deployment activities will involve the replacement of older console equipment (including Visual Display Units and computer Head Disk Assemblies), and related software upgrades, at all operational LCCs located within the three MM Wings, and at various trainer and support facilities located at each Wing support base, Hill AFB, Vandenberg AFB, and at other USAF/contractor support locations. Deployment at all trainer units will be completed prior to fielded deployment in 2006. Deployment of the remaining equipment at operational facilities will occur as part of routine maintenance, or by force deployment over a 3-year period beginning at the end of 2005 or 2006. In most cases, the old console equipment will be declassified and turned over to the local or regional Defense Reutilization and Marketing Office for resale, material recycling, and/or disposal as solid or hazardous waste.

Under the No Action Alternative, the USAF would not proceed with the proposed MM III modification. However, ongoing system monitoring and testing of MM III components and subsystems (including annual missile flight tests) would continue at all locations where such operations are currently conducted. By not implementing the proposed modifications, the nuclear safety and future reliability of the MM III weapon system would not be enhanced. Eventually, the No Action Alternative would require some missiles to be removed from the operational force, thus reducing the overall mission readiness of the MM III ICBM system and jeopardizing national security.

Though other possible alternatives to the Proposed Action were considered—including computer simulations and alternative test locations—all were deemed unreasonable and eliminated from further analysis.

Environmental Effects: Potential environmental effects associated with the Proposed Action and No Action Alternatives were assessed for the following environmental resources: air quality, noise, biological resources, cultural resources, health and safety, and hazardous materials and waste management. Other resource areas—including hydrology and groundwater, utilities, solid waste management, land use, socioeconomics, environmental justice, soil resources, and visual and aesthetic resources—were not analyzed further because no significant impacts to these resources are anticipated as a result of implementing the Proposed Action. Potential effects on the environment from implementation of the Proposed Action are described in the following paragraphs.

- **Air Quality.** For missile flight tests at Vandenberg AFB, rocket motor exhaust emissions will be released into the lower atmosphere. Because the launches are infrequent, short-term events, emissions products will be rapidly diluted and dispersed by prevailing winds. No violation of air

quality standards or health-based standards for non-criteria pollutants is anticipated. No changes to existing or new air emission permits are required. Also, a review of the General Conformity Rule resulted in a finding of presumed conformity with the State Implementation Plan. From a global perspective, the exhaust emissions released from the MM III motors into the upper atmosphere will add to the overall global loading of chlorine and other gases that contribute to long-term ozone depletion. However, when compared to the amount of emissions released on a global basis, the flight tests will not be statistically significant in contributing to cumulative impacts on the stratospheric ozone layer. Overall, no significant impacts to air quality will occur.

- **Noise.** Each MM III flight test launch will generate noise levels ranging from 125 decibels (dB) (unweighted) in the immediate vicinity of the launch site at Vandenberg AFB, to around 105 dB (unweighted) or lower in some populated areas off base. While these noise exposure levels can be characterized as very loud, they will occur infrequently, are very short in duration (about 20 seconds per launch), and will have little effect on the Community Noise Equivalent Level off base. Sonic booms generated by the MM III missile will typically start reaching the surface some 25 nautical miles downrange of the launch site, and thus will not affect coastal land areas. Consequently, no significant impacts to the noise environment will occur.
- **Biological Resources.** For biological resources at Vandenberg AFB, some disturbances to marine mammals and migratory birds from missile launches and helicopter overflights are expected. However, a National Marine Fisheries Service (NMFS) incidental “take” permit is in place that authorizes incidental harassment of pinnipeds. Helicopter overflights are required to maintain minimal distances away from protected seal haul-outs/rookeries and bird roosting/nesting areas. On-base monitoring before and after launches has shown no long-term effects on seals, or seabirds and shorebirds. Other studies at the base have shown no concerns for long-term acidification of surface waters as a result of launch emissions. Some temporary distress to vegetation near launch sites can be expected. Though the probability for an aborted MM III launch to occur is extremely low, the dispersion of unburned propellant in such cases is not expected to cause concern for perchlorate build-up in local waters. Base actions would immediately be taken to recover and cleanup unburned propellant and any other hazardous materials that had fallen on the beach or in shallow waters. Any liquid or solid propellant falling into the offshore waters would be subject to continual mixing and dilution due to the ocean waves and currents, and hence, local accumulation of perchlorates from the propellants would not be significant.

For the over-ocean launch corridor, sonic boom overpressures from MM III launch vehicles could be audible to protected marine species underwater. Underwater pressure waves generated by the sonic booms are expected to be less than 140 dB, which is well below the lower limit (178 dB) for inducing behavioral reactions, and the lower limit (218 dB) for inducing temporary threshold shift (TTS) in marine mammals and sea turtles, all sound pressure levels being referenced to 1 micro Pascal (μPa). Because the resulting pressures will be relatively low, and very short in duration, no long-term adverse effects are anticipated. For marine animals, the potential also exists for direct contact or exposure to underwater shock/sound waves from the splashdown of spent rocket motors. However, in the open ocean, the probability of impacting protected marine mammals and sea turtles is insignificant based on statistical analyses. The MM III flight tests will occur only 3 to 4 times per year, and motor impacts from each flight will likely not occur at the exact same locations. Though residual amounts of battery electrolytes, hydraulic fluid, propellants, and other materials in the spent rocket motors could lead to the contamination of seawater, the risk of marine life coming in contact with, or ingesting, toxic levels of solutions is unlikely, considering the rapid dilution of any contaminants and the rapid sinking of any contaminated components to the ocean floor.

At USAKA, target sites for test RVs are located in the deep ocean area east of the Kwajalein reef or in the vicinity of Illeginni Island. Though migratory seabirds and shorebirds near RV impact areas can be expected to exhibit brief flight responses to sonic boom overpressures, local populations do not appear to have been adversely affected by years of testing. The sonic booms could also affect hearing in marine mammals and sea turtles underwater. However, at 117 to 176 dB (referenced to 1 μ Pa), the resulting underwater pressures will fall just below the lower limit for inducing behavioral reactions (178 dB referenced to 1 μ Pa), and well below the lower limit for inducing TTS (218 dB referenced to 1 μ Pa) in such animals. Because the resulting pressures will be relatively low, and very short in duration, no long-term adverse effects are anticipated. Like the spent MM III rocket motors, an RV impacting in the ocean or Kwajalein Atoll lagoon will result in underwater shock/sound waves, but with much higher pressure-levels being generated. At distances within a few thousand yards of an RV impact point, underwater pressure levels could induce behavioral reactions (e.g., abrupt movements, changes in surfacing, and sudden dives) in marine mammals, and possibly sea turtles. If they occur, such reactions would last for a very brief period and not result in any long-term effects. At a distance of 128 feet (ft) [39 meters (m)] from the RV splashdown site, TTS could begin to occur; and within several feet of the impact point, the pressure levels could prove fatal to these animals. However, the number of groups (small pods or schools) of these animals to be struck or exposed to harmful underwater shock/sound waves is estimated to be no higher than 0.000003 to 0.000009 per RV test event, depending on the number of RV simulators carried on the launch vehicle. The risk of physically injuring or killing the animals is extremely low in view of the facts that: (1) only 3 to 4 MM III launches will be conducted every year, (2) RV target locations are not always the same, and (3) the probability of impact on marine mammals and sea turtles caused by underwater shock/sound waves is insignificant.

Target areas for RVs will be selected to minimize impacts to protected reefs and identified wildlife habitats. When an RV impacts directly on Illeginni Island or in the shallow coral reefs of Kwajalein Atoll, a crater will form. Post-test debris recovery and cleanup operations on Illeginni Island will also cause some short-term disturbance. Such impacts could potentially result in the loss of some protected migratory birds, mollusks, sponges, corals, and other marine life; and damage small areas of migratory bird habitat, sea turtle nesting habitat, and coral reef habitat. The USAF has projected that approximately four to five RVs will impact at Illeginni over the next 20 years. The overall effects of these impacts are considered to be minimal.

Following an RV airburst or impact of an RV in the ocean, the Kwajalein Atoll lagoon, and/or on Illeginni Island, the resulting debris would disseminate any on-board hazardous materials—such as beryllium (Be) and depleted uranium (DU)—around the impact point and some distance downwind. However, the contaminants released by some RVs are extremely insoluble, and the dilution and mixing of the ocean and lagoon are so great that the concentration in water would be no different than natural background levels. Short-term exposures to birds or other wildlife is unlikely to result in significant accumulations, particularly when considering the small amount of unrecovered material that may persist in the environment. Thus, RV contaminants do not present a major hazard to terrestrial and marine life.

In the biological opinion regarding effects on nesting habitat for green sea turtles (*Chelonia mydas*) at Illeginni Island (Appendix D in the EA), the US Fish and Wildlife Service (USFWS) determined that the Proposed Action (along with reasonable and prudent measures, and conservation measures) is not likely to jeopardize the continued existence of the species. No critical habitat has been designated for this species; therefore, none will be affected. An Incidental Take statement—for the loss of no more than three green sea turtle nests, or injury or loss of up to 300 hatchlings, per year as a result of project-related RV impacts in the vicinity of Illeginni Island—is included in the biological opinion.

Though such losses are not likely to occur, it is expected that they would be offset by the implementation of conservation measures identified in the biological opinion.

Overall, no significant impacts to biological resources will occur at any of the locations affected. The implementation of mitigation measures identified in the EA will help minimize or eliminate potentially adverse impacts that might occur.

Because of the potential for adverse impacts on biological resources at USAKA, the proposed RV flight test activities will also require a Document of Environmental Protection (DEP) in accordance with the UES. Separate from the NEPA process under which the EA is being prepared, the DEP process serves to provide a structured forum for USAKA, US Government agencies, the RMI Environmental Protection Authority (RMIEPA), and the general public to review and comment on proposed US activities that have the potential to affect the USAKA environment.

- ***Cultural Resources.*** Given the extremely limited potential for any remaining traditional/prehistoric remains on Illeginni Island, the likelihood of impacts to any resources must be considered either non-existent or extremely low. Though several buildings on the island are of the Cold War era, they currently do not meet RMI criteria for historic significance. Additionally, there is a low probability for the buildings to be impacted by RV tests. As a result, little or no impacts to cultural resources are expected.
- ***Health and Safety.*** All program activities will be accomplished in accordance with applicable DOD, Federal, state, and foreign health and safety standards. Regarding rocket motor transportation over public roads, accident rates for ICBM-related operations have historically been very low. For flight tests from Vandenberg AFB, range safety officials will evacuate the launch hazard area and issue Notices to Airmen, as well as to Mariners, and the missile hazard zones will be determined clear of both aircraft and surface vessels before proceeding with any flight test. At USAKA, the RV flight tests will require that the Mid-Atoll Corridor Impact Area be cleared of aircraft and vessels in a similar manner. Non-essential personnel are evacuated from the RV impact area, while remaining personnel are placed in protective shelters.

As previously mentioned, some RV tests at USAKA will release hazardous and toxic materials around the impact area. For a land impact on Illeginni Island, such debris will occur close to the point of impact, mostly within a 328-ft (100-m) radius. As a result, the major potential health concern of these tests is the subsequent effects on workers visiting the island, in support of long-term management and restoration of the island. However, modeling and post-test sampling results from prior RV flight tests have shown that air sampling levels for Be and DU contaminants are far below Federal guidelines, and similar to pre-test background levels. Various post-test safety and health procedures already in place will be followed. These procedures include securing the impact area from inadvertent traffic, and the protection of on-site workers from respiratory exposure during post-test cleanup operations. These and other mitigation measures listed in Section 4.7 of the EA will be applied to all RV tests at USAKA.

By adhering to established safety standards and procedures, the level of risk to military personnel, contractors, and the general public will be minimal at all of the locations affected. Thus, no significant impacts to either occupational or public health and safety are expected to occur.

- ***Hazardous Materials and Waste Management.*** For hazardous materials and waste management, activities at each affected installation are governed by specific environmental regulations, and existing pollution prevention and facility response plans, that minimize any potential environmental consequences resulting from the use and handling of these materials. Each installation has a plan in

place that provides guidelines and instructions to prevent and control accidental spills of hazardous materials, including a description of appropriate countermeasures to contain, clean up, and mitigate the effects of a spill or discharge. Appropriate permits are in place and workers are trained to follow procedures for the proper storage, transportation, and disposal of hazardous waste. Hazardous material and waste handling capacities will not be exceeded, and management programs will not have to change.

In regards to the release of hazardous and toxic materials from RV tests at Illeginni Island, any residual fragments of RVs will be recovered from land or shallow water areas and properly disposed of in accordance with the UES and all applicable US regulations. As previous sampling results have shown, levels of Be and DU contaminants in the air at Illeginni Island continue to remain at or near background levels, even after years of testing. Be and DU soil concentrations on the island can exceed background levels in the vicinity of RV impact sites. However, the Be and DU concentrations in the dissolved form are below background levels. In addition, the rates of dilution for Be and DU are significantly greater than their rates of dissolution in water, ensuring that the concentrations would not exceed background levels.

Consequently, no significant impacts from the management of hazardous materials and waste will occur at any of the sites affected.

Monitoring and Mitigation: Within the EA, various management controls and engineering systems for all locations affected are described. Required by Federal, state, DOD, and Service-specific environmental and safety regulations, and international agreements, these measures are implemented through normal operating procedures.

In addition, to minimize the level of impacts that might occur at USAKA as a result of the RV flight tests, specific monitoring activities and mitigation measures have been identified for implementation as part of the proposed MM III Modification. They include specific recovery and cleanup procedures for the removal of RV debris, air and soil monitoring for potential contaminants, minimizing disturbance of forest vegetation, the preservation and protection of sea turtle nesting habitat, and biological tissue sampling. These and other mitigation measures to be implemented are summarized in Section 4.7 of the EA. Additional measures for the protection of sea turtle nesting habitat at USAKA are included in the USFWS biological opinion provided in Appendix D of the EA.

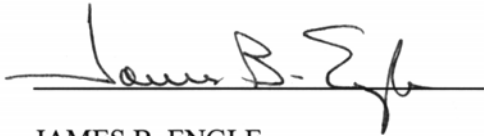
As part of the DEP process described earlier, the USAF will continue coordination and consultation with USAKA, the USFWS and NMFS Pacific Islands Regional Offices in Hawaii, the US Environmental Protection Agency (Region IX), and the RMIEPA, to clarify current mitigation measures and determine whether any additional mitigation measures are warranted. Biennial biological resource inventories at USAKA, which are conducted by USFWS and NMFS personnel, will also continue in accordance with the UES.

Public Review and Comment: An availability notice for public review of the Draft EA and Draft FONSI was published in local newspapers for each program support location on or before September 2, 2004, initiating a 30-day review period that ended on October 1, 2004. Because of an inadvertent failure of the *Kwajalein Hourglass* to publish the availability notice on schedule, the notice was published at a later date, and the residents of USAKA were provided an additional 15-day review period that ended on October 29, 2004. During review periods, copies of the Draft EA and Draft FONSI were made available in local libraries or offices in California, Colorado, Montana, Nebraska, North Dakota, Utah, Wyoming, and the RMI. The Draft EA and Draft FONSI also appeared on the Space and Missile Systems Center (SMC), Los Angeles AFB web site at <http://ax.losangeles.af.mil/axf>, listed under “announcements.” Comments received during the public review were addressed and incorporated in the Final EA.

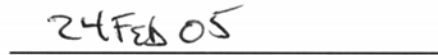
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Conclusion: Based upon review of the facts and analyses contained in the EA, the USAF has concluded that implementation of the Proposed Action will not have a significant environmental impact, either by itself or cumulatively with other projects. Accordingly, the requirements of NEPA, the CEQ Regulations, 32 CFR Part 989, and UES are fulfilled and an Environmental Impact Statement is not required.

Approved:



JAMES B. ENGLE
Deputy Assistant Secretary
(Science, Technology and Engineering)
Assistant Secretary of the Air Force for Acquisition



Date

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base	ESQD	Explosive Safety Quantity
AFI	Air Force Instruction		Distance
AFOSH	Air Force Occupational Safety and Health	ETR	Extended Test Range
		EWR	Eastern and Western Range
AFPD	Air Force Policy Directive	FDE	Force Development Evaluation
AFSPC	Air Force Space Command	ft	Feet
ALC	Air Logistics Center	FMP	Fishery Management Plan
Al ₂ O ₃	Aluminum Oxide	FONSI	Finding of No Significant Impact
AS&I	Assembly, Surveillance, and Inspection	FR	Federal Register
		FY	Fiscal Year
AVE	Aerospace Vehicle Equipment	GBI	Ground-Based Interceptor
Be	Beryllium	GMD	Ground-Based Midcourse Defense
CA	California		
CAA	Clean Air Act	HAFB	Hill Air Force Base
CAAQS	California Ambient Air Quality Standards	gal	Gallon
		HCl	Hydrogen Chloride
CARB	California Air Resources Board	HDA	Head Disk Assembly
CEQ	Council on Environmental Quality	HMMP	Hazardous Materials Management Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	Hz	Hertz
		ICBM	Intercontinental Ballistic Missile
CFC	Chlorofluorocarbon	IRP	Installation Restoration Program
CFR	Code of Federal Regulations	JTA	Joint Test Assembly
CH ₆ N ₂	Monomethylhydrazine	KEEP	Kwajalein Environmental Emergency Plan
cm	Centimeter	kg	Kilogram
CNEL	Community Noise Equivalent Level	km	Kilometer
		L	Liter
CO	Carbon Monoxide	lb	Pounds
CO	Colorado	LCC	Launch Control Center
CO ₂	Carbon Dioxide	LF	Launch Facility
COP	Console Operations Program	LHA	Launch Hazard Area
CRT	Cathode Ray Tube	LLNL	Lawrence Livermore National Laboratory
CSF	Conforming Storage Facility		
dB	Decibels	LOA	Letter of Authorization
dBA	A-weighted Decibels	m	Meter
DEP	Document of Environmental Protection	MAF	Missile Alert Facility
		MDA	Missile Defense Agency
DOD	Department of Defense	mi	Mile
DOE	Department of Energy	MM	Minuteman
DOT	Department of Transportation	MMPA	Marine Mammal Protection Act
DRMO	Defense Reutilization and Marketing Office	MOD	Model
		MPF	Missile Processing Facility
DRMS	Defense Reutilization and Marketing Service	MSL	Mean Sea Level
		MT	Missile Transporter
DU	Depleted Uranium	MT	Montana
EA	Environmental Assessment	NAAQS	National Ambient Air Quality Standards
ECSG	Electronic Command Signal Generator		
		NASA	National Aeronautics and Space Administration
EFH	Essential Fish Habitat		
EIS	Environmental Impact Statement	ND	North Dakota
EMAD	Embedded Memory Array	NEPA	National Environmental Policy Act
	Dynamic		

NMFS	National Marine Fisheries Service	TVC	Thrust Vector Control
NO ₂	Nitrogen Dioxide	U	Uranium
N ₂ O ₄	Nitrogen Tetroxide	UES	USAKA Environmental Standards
NOA	Notice of Availability	US	United States
NOAA	National Oceanic and Atmospheric Administration	USAF	United States Air Force
NOTAM	Notice to Airmen	USAKA	US Army Kwajalein Atoll
NOTMAR	Notice to Mariners	USASMDC	US Army Space and Missile Defense Command
NO _x	Nitrogen Oxides	USASSDC	US Army Space and Strategic Defense Command
NRHP	National Register of Historic Places	USC	United States Code
OO-ALC/SPO	Ogden Air Logistics Center ICBM System Program Office	USEPA	US Environmental Protection Agency
OSHA	Occupational Safety and Health Administration	USFWS	US Fish and Wildlife Service
PCBs	Polychlorinated Biphenyls	UT	Utah
PL	Public Law	VAFB	Vandenberg Air Force Base
PM _{2.5}	Particulate Matter Less Than or Equal to 2.5 Micrometers	VOC	Volatile Organic Compound
PM ₁₀	Particulate Matter Less Than or Equal to 10 Micrometers	VDU	Visual Display Unit
PMFC	Pacific Marine Fishery Council	WMO	World Meteorological Organization
PMRF	Pacific Missile Range Facility	WPRFMC	Western Pacific Regional Fishery Management Council
ppm	Parts per Million	WY	Wyoming
psf	Pounds per Square Foot	µg/g	Micrograms per Gram
PSRE	Propulsion System Rocket Engine	µg/m ³	Micrograms per Cubic Meter
PTS	Permanent Threshold Shift	µPa	Micro Pascal
RCRA	Resources Conservation and Recovery Act	µPa ² s	Micro Pascal-Squared-Second
REACT SLEP	Rapid Execution and Combat Targeting Service Life Extension Program		
RMI	Republic of the Marshall Islands		
RMIEPA	Republic of the Marshall Islands Environmental Protection Authority		
ROI	Region of Influence		
RS	Reentry System		
RTS	Ronald Reagan Ballistic Missile Defense Test Site		
RV	Reentry Vehicle		
SBCAPCD	Santa Barbara County Air Pollution Control District		
SERV	Safety Enhanced Reentry Vehicle		
SHPO	State Historic Preservation Office		
SMIC	Strategic Missile Integration Complex		
SO ₂	Sulfur Dioxide		
SW	Space Wing		
SWI	Space Wing Instruction		
TE	Transporter Erector		
TTS	Temporary Threshold Shift		

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

As a result of previous United States (US) initiatives to cancel development programs for new intercontinental ballistic missile (ICBM) weapon systems, and its ongoing action to retire the current Peacekeeper ICBM weapon system, the Minuteman (MM) III weapon system will become the only land-based ICBM in America's nuclear arsenal (HAFB, 2003). In the December 2001 Nuclear Posture Review Report submitted to Congress, the Secretary of Defense laid out the direction for American nuclear forces over the next 10 years (DOD, 2002). As specified in the Report, the newer Peacekeeper Mark 21 reentry vehicles (RVs) would be transferred onto the fielded MM III ICBMs to enhance the safety and maintain the reliability of the MM III weapon system.

In addition to the transfer of the Mark 21 RVs, the command and control system for fielded MM III ICBMs requires the upgrade and replacement of aging electronic assemblies located at existing MM III Launch Control Centers (LCCs). The planned upgrades would include software improvements and hardware changes necessary to correct system deficiencies.

As the proponent for the proposed MM III modification, the Ogden Air Logistics Center ICBM System Program Office (OO-ALC/SPO) at Hill AFB is responsible for providing technical and logistical support for ICBM follow-on test and evaluation requirements, and managing acquisition efforts associated with silo-based ICBM systems.

In support of the OO-ALC/SPO, the Space and Missile Systems Center, Environmental Management Branch of Acquisition Civil and Environmental Engineering, determined that an Environmental Assessment (EA) was required to assess the potential environmental impacts from the testing and deployment activities associated with the MM III modification. This EA was prepared in accordance with the following regulations, statutes, and standards:

- National Environmental Policy Act (NEPA, 1969)
- Executive Order 12114 (*Environmental Effects Abroad of Major Federal Actions*) (Office of the President, 1979)

The Purpose of an Environmental Assessment

An Environmental Assessment (EA) is prepared by a Federal agency to determine if an action it is proposing would significantly affect any portion of the environment.

The intent of an EA is to provide project planners and Federal decision-makers with relevant information on the impacts that a proposed action might have on the human and natural environments.

If the study finds no significant impacts, then the agency can record the results of that study in an EA document, and publish a Finding of No Significant Impact (FONSI). The agency can then proceed with the action. However, if the results of the EA indicate that there would be potentially significant impacts associated with the action, then the agency must proceed with the following actions:

- The executing agency must prepare and implement a mitigation plan that reduces the action's environmental impact(s) to less-than-significant levels; or,
- If the action cannot be feasibly mitigated to a level of no significant impact, the executing agency must then prepare and publish a detailed Environmental Impact Statement (EIS) to analyze the impacts in greater depth for the decision-makers' consideration.

- The President's Council on Environmental Quality (CEQ) Regulations for Implementing NEPA [40 Code of Federal Regulations (CFR) Parts 1500-1508] (CEQ, 2002)
- US Air Force (USAF) Regulations for Implementing NEPA (32 CFR Part 989, *Environmental Impact Analysis Process*) (USAF, 2001d)
- *Environmental Standards and Procedures for US Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands* (USASMD, 2003a).

1.2 BACKGROUND

The USAF is currently in the process of deactivating from service all 50 Peacekeeper ICBMs currently deployed in underground silos near FE Warren Air Force Base (AFB), Wyoming. Previously analyzed in the *Final Environmental Impact Statement for Peacekeeper Missile System Deactivation and Dismantlement* (USAF, 2000b), the deactivation process should be completed in 2005.

To compensate for deactivation of the Peacekeeper missiles, and for the termination of earlier ICBM replacement programs, the Department of Defense (DOD) will extend the life of the MM III weapon system. The current MM force consists of 500 missiles located within the three MM Wings at FE Warren AFB; Malmstrom AFB, Montana; and Minot AFB, North Dakota. A comprehensive set of life-extension/sustainment programs is currently underway to keep the missiles safe, secure, and reliable through the year 2020. Representing additional MM III life-extension actions, the proposed modifications analyzed in this EA involve reconfiguring the MM III ICBM so that it is capable of carrying the Mark 21 RV, which is currently deployed on Peacekeeper missiles.

In conjunction with the modifications for Mark 21 RVs, upgrade of electronic command and control console equipment and software would be needed at all LCCs located within the three MM Wings, and at several other USAF and contractor trainer/test facilities supporting MM III ICBM operations. The upgrades are needed to resolve a variety of software deficiencies and aging hardware failures. Only with the planned console upgrades can the USAF ensure a reliable command and control for the MM III weapon system through the year 2020.

1.3 PURPOSE OF THE PROPOSED ACTION

The proposed MM III modification involves design, development, testing, and deployment of new hardware/software, equipment, data, and trainers needed to incorporate Mark 21 RVs onto the Reentry System (RS) of existing MM III missiles at all three MM Wings. While reducing the overall number of nuclear warheads deployed on MM III missiles, this action would enhance the nuclear safety and improve the future reliability of the weapon system.

In conjunction with the deployment of RS modification kits and Mark 21 RVs, electronic command and control console equipment would be deployed, and console operations software upgraded, at all existing MM III LCCs and at other support locations. In addition to enhancing the targeting flexibility of the Mark 21 RVs through software changes, implementation of the console upgrades would correct a multitude of software deficiencies that affect critical combat capabilities for the MM III weapon system. It would also upgrade and replace aging electronic hardware assemblies with newer and more reliable units having improved logistics supportability.

1.4 NEED FOR THE PROPOSED ACTION

Because of recent developments concerning long-term nuclear weapons safety and reliability, force structure changes driven by nuclear arms reductions, and the absence of a replacement system for the MM III ICBM, it is imperative that US forces be given the ability to: (1) transition the newer Mark 21 RV from the deactivated Peacekeeper weapon system to the existing MM III force; and (2) upgrade the existing command and control systems at MM III LCCs, and at other supporting locations. Without these improvements, the long-term safety and reliability of MM III missiles currently deployed with the older RVs could be degraded. Eventually, this would require those missiles to be removed from the operational force. In addition, the continued use of deficient command and control software, and aging console hardware, would ultimately degrade system reliability and availability of fielded MM IIIs at all three MM Wings. Not implementing these improvements would reduce the overall mission readiness of the MM III ICBM system and jeopardize national security.

1.5 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This EA documents the environmental analysis of: (1) MM III missile flight tests using modified RS hardware/software, in addition to the continuation of Force Development Evaluation (FDE) flight tests; (2) deployment of new and modified RS hardware/software; and (3) deployment activities for new command and control console equipment. The types of activities and locations involved with these actions are briefly described in the following paragraphs, and are shown in Figure 1-1.

- **Flight Test and Evaluation of the RS Modification.** Following the development and qualification of hardware/software modifications to the RS, MM III missile flight tests, utilizing the modified RS, would be conducted at Vandenberg AFB, California. The MM boosters used in the flight tests would be pulled from operational launch facilities (LFs) randomly selected at the Wings. The LFs would then receive replacement boosters provided by the rocket motor depot maintenance facility at Hill AFB, Utah.

At Vandenberg AFB, the missile launches would occur from existing silos that are regularly used for these types of tests. On each test missile, the operational RVs are replaced with simulated RVs. At the terminal end of each missile flight test, the RVs would impact near USAKA in the Republic of the Marshall Islands (RMI). In addition to the ongoing three to four MM III FDE flight tests conducted every year, two additional flight tests per year would occur in Fiscal Years 2005 and 2006.

- **Deployment of RS Modification Kits and Mark 21 RVs.** Starting in late 2006, RS modification kits and related support equipment would be shipped from existing contractor facilities to each of the Wings (FE Warren, Malmstrom, and Minot AFBs), and to other test and trainer facility locations. Then, beginning in 2006 and continuing through 2011, the kits would be deployed onto existing MM III missiles at all three Wings. During this process, Mark 21 RVs would also be deployed at select missile silos, in addition to removal of all the older Mark 12 RVs.

The long-term storage and/or disposition requirements for the Mark 12 RVs are not part of the proposed MM III modification.

- **Deployment of New Console Equipment.** Deployment activities would involve the replacement of command and control console equipment, and related software upgrades, at all operational LCCs located within the three MM Wings; and at various trainer and support facilities at each Wing support base, Hill AFB, Vandenberg AFB, and at other USAF/contractor support locations. The deployment activities would consist of: (1) replacement of the computer Head Disk Assembly (HDA),

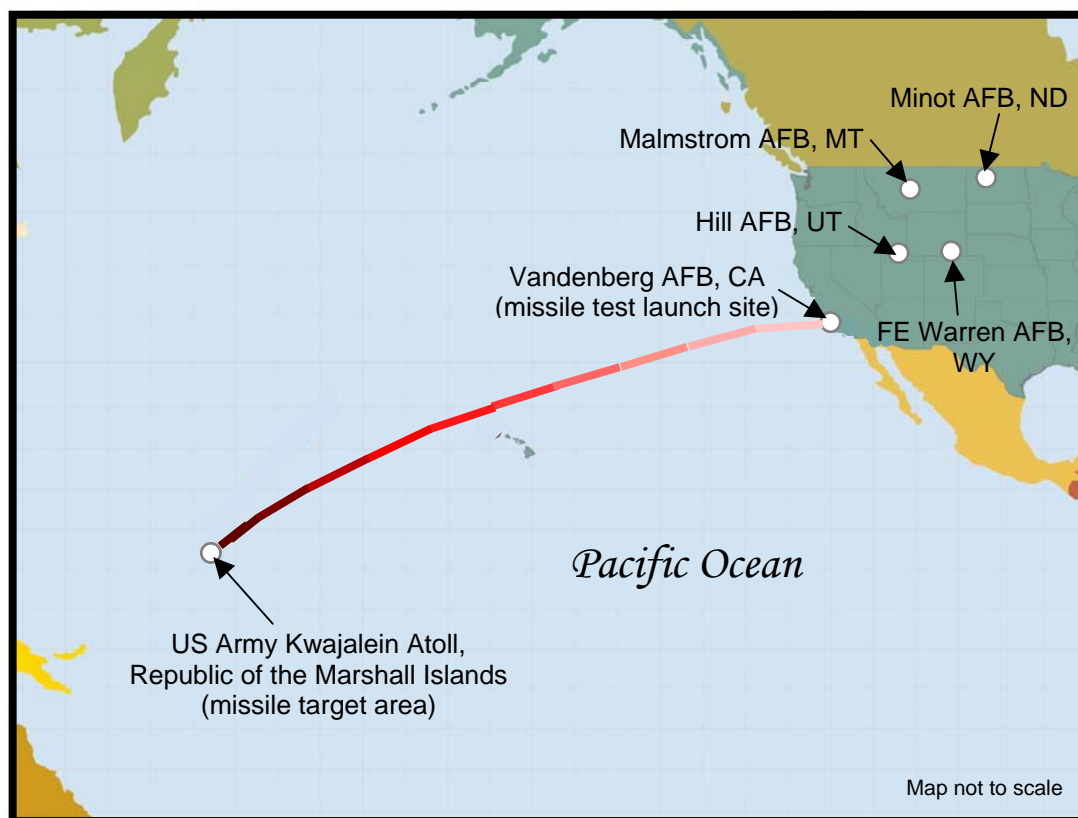


Figure 1-1. Locations for Proposed Minuteman III Modification

(2) replacement of the Visual Display Unit (VDU), and (3) upgrade of the Console Operations Program (COP) software and replacement of the Embedded Memory Array Dynamic (EMAD) module.

Deployment at all trainer units would be completed prior to fielded deployment in 2006. Operational facilities would likely receive the COP upgrade and replacement EMAD modules in 2006.

Deployment of the remaining HDAs and VDUs would occur as part of routine maintenance, or by force deployment over a 3-year period beginning at the end of 2005 or 2006.

In accordance with CEQ and USAF regulations [40 CFR 1502.14(d) and 32 CFR 989.8(d), respectively], this EA also analyzes the No Action Alternative, which serves as the baseline from which to compare the Proposed Action. Under the No Action Alternative, none of the activities supporting the proposed MM III modification would occur. However, through ICBM follow-on test and evaluation programs, ongoing system monitoring, testing, and routine maintenance of MM III components (including annual missile flight tests at Vandenberg AFB) would continue to ensure weapon system safety, accuracy, and reliability for the remaining life of the MM III system.

1.6 DECISIONS TO BE MADE

Supported by the information and environmental impact analysis presented in this EA, the USAF will decide on whether to proceed in implementing the proposed MM III modification, or to select the No Action Alternative.

1.7 INTERAGENCY COORDINATION

Ongoing interagency coordination is integral to the preparation of this EA. The USAF has closely coordinated with both the Department of Energy (DOE) and the US Army Space and Missile Defense Command (USASMDC) as cooperating agencies during the analysis—the DOE for their involvement in supporting RV flight tests, and the USASMDC for the use of USAKA as a targeting area for test RVs.

Beginning in October 2003, the USAF initiated informal consultations with the Pacific Islands Regional Offices of the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), both located in Honolulu, Hawaii. Pursuant to the requirements of the *Environmental Standards and Procedures for US Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands* (USASMDC, 2003a), hereafter referred to as the USAKA Environmental Standards or UES, the USAF has held several consultation meetings and teleconferences with the agencies to discuss the potential for environmental impacts from the proposed RV flight test activities at USAKA, and to identify possible mitigation measures to minimize the level of impacts.

On January 29, 2004, the USAF held a formal consultation meeting with the RMI Environmental Protection Authority (RMIEPA) and RMI Historic Preservation Office in Majuro, capital of the RMI Government, to review the proposed RV flight tests, and their potential for environmental and public health impacts at Kwajalein Atoll. Representatives from the USASMDC, USAKA, USFWS, NMFS, DOE, and US Environmental Protection Agency (USEPA) Region IX participated in this meeting. The USAF also solicited comments on the *Coordinating Draft Environmental Assessment for Minuteman III Modification* from the RMI Government and all of the participating agencies.

In September 2004, the USAF initiated formal consultation with the USFWS (Pacific Islands Regional Office), as required by Section 3-4.5.3 (Consultation Procedures for Endangered and Threatened Resources) of the UES (USASMDC, 2003a), because of potential effects on green sea turtle (*Chelonia mydas*) nesting habitat at USAKA. In response, the USFWS provided the USAF a biological opinion on the effects of the proposed project on the green sea turtle, a Federally listed threatened species under the US Endangered Species Act and a USAKA Species of Concern for which consultation was triggered under the UES. A copy of the USFWS biological opinion is provided in Appendix D of this Final EA.

Through interagency coordination, it has also been determined that the proposed RV flight test activities at USAKA will require a Document of Environmental Protection (DEP) in accordance with Section 2-17.3 of the UES (USASMDC, 2003a) because of potential impacts on biological resources. Separate from the NEPA process under which this EA is being prepared, the DEP process serves to provide a structured forum for USAKA, US Government agencies, the RMIEPA, and the general public to review and comment on proposed US activities that have the potential to affect the USAKA environment. At the completion of the process, appropriate agencies will sign the DEP to indicate agreement with the proposed activity, requirements, and limitations. With the support of the USASMDC, the USAF formally initiated the DEP process with submittal of a Notice of Proposed Activity to the USFWS, NMFS, USEPA (Region IX), US Army Corps of Engineers, and the RMIEPA on September 28, 2004. Completion of the DEP process is expected in early 2005, following public review and comment on the Draft DEP.

1.8 PUBLIC NOTIFICATION AND REVIEW

In accordance with CEQ (2002) and USAF (2001d) regulations for implementing NEPA, the USAF solicited comments on the Draft EA from interested and affected parties. A Notice of Availability (NOA) for the Draft EA and the enclosed Draft FONSI, was published in local newspapers for each location involved (see Table 1-1), announcing the 30-day review and comment period which ended on October 1, 2004. As part of this effort, copies of the Draft EA and Draft FONSI were placed in local libraries or

Table 1-1. Newspaper Publications for the Notice of Availability

State or Country	City/Town	Newspaper	Publication Date
California	Santa Barbara	<i>Santa Barbara News-Press</i>	August 31, 2004
	Santa Maria	<i>Lompoc Record</i>	August 31, 2004
		<i>Santa Maria Times</i>	August 31, 2004
Colorado	Greeley	<i>Greeley Tribune</i>	August 31, 2004
	Sterling	<i>Journal Advocate</i>	August 31, 2004
Montana	Choteau	<i>Choteau Acantha</i>	September 1, 2004
	Cut Bank	<i>Cut Bank Pioneer Press</i>	September 1, 2004
	Great Falls	<i>Great Falls Tribune</i>	August 31, 2004
		<i>High Plains Warrior</i>	August 27, 2004
	Havre	<i>Havre Daily News</i>	August 30, 2004
	Lewistown	<i>Lewistown News-Argus</i>	September 1, 2004
Nebraska	Scottsbluff	<i>Star-Herald</i>	August 31, 2004
	Sidney	<i>Sidney Sun-Telegraph</i>	August 31, 2004
North Dakota	Minot	<i>Minot Daily News</i>	August 31, 2004
		<i>Northern Star</i>	August 27, 2004
Utah	Ogden	<i>Hilltop Times</i>	August 26, 2004
		<i>Standard-Examiner</i>	August 26, 2004
Wyoming	Cheyenne	<i>Wyoming Tribune-Eagle</i>	August 31, 2004
Republic of the Marshall Islands	Majuro	<i>Marshall Islands Journal</i>	August 27, 2004
	USAKA	<i>Hourglass</i>	October 15, 2004

offices (see Table 1-2), in addition to making them available over the Internet. Copies of the Draft EA and Draft FONSI were also mailed directly to Federal, state, and local agencies and officials; the RMI Government; and special interest groups, identified by each of the affected installations and ranges. Because of an inadvertent failure of the *Kwajalein Hourglass* to publish the NOA on schedule, the notice was published at a later date, and the residents of USAKA were provided an additional 15-day review period that ended on October 29, 2004.

Following the public review period, comments received were considered in the preparation of the Final EA and the recommended changes were incorporated, as appropriate. Appendix C of this Final EA contains a reproduction of all the written comments received, and responses to those comments. A copy of the Final EA and FONSI has been sent to those organizations and individuals who provided comments on the Draft EA/FONSI, or who specifically requested a copy of the final document. The Final EA and FONSI can also be accessed over the Internet at <http://ax.losangeles.af.mil/axf>.

Table 1-2. Locations for Viewing the Draft Environmental Assessment		
State or Country	City/Town	Location
California	Lompoc	Lompoc Public Library
	Santa Barbara	Davidson Library, University of California
		Santa Barbara Public Library
	Santa Maria	Santa Maria Public Library
Colorado	Greeley	Farr Branch Library
	Sterling	Sterling Public Library
Montana	Cut Bank	Glacier County Public Library
	Great Falls	Great Falls Public Library
	Havre	Havre-Hill County Library
	Lewistown	Lewistown Public Library
Nebraska	Kimball	Kimball Public Library
	Sidney	Sidney Public Library
North Dakota	Minot	Gordon B. Olson Library, Minot State University
		Minot Public Library
Utah	Ogden	The Draft EA was available over the Internet and from the NEPA Program Manager at Hill AFB.
Wyoming	Burns	Burns Branch Library
	Cheyenne	Laramie County Library
	Pine Bluffs	Pine Bluffs Branch Library
	Torrington	Goshen County Library
Republic of the Marshall Islands	Majuro	Alele Museum, Library, and National Archives
	USAKA	Grace Sherwood Library
		Roi-Namur Library

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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

Two alternatives are assessed in this EA—the Proposed Action and the No Action Alternative. Section 2.1 provides a description of the MM III system, including missile system components and the operational MM Wings. Section 2.2 provides a description of the No Action Alternative. Section 2.3 gives a detailed description of the Proposed Action by phase and activity. Alternatives to the Proposed Action that were considered and eliminated from further study are discussed in Section 2.4. A summary comparison of the environmental impacts associated with the Proposed Action and the No Action Alternative is presented in Section 2.5. Lastly, Section 2.6 identifies the USAF's preferred alternative.

2.1 MINUTEMAN III SYSTEM DESCRIPTION

2.1.1 Minuteman III Missile

The MM III ICBM consists of five major missile sections: the three-stage solid-propellant booster, the propulsion system rocket engine (PSRE), the missile guidance set, the Model or MOD 7 instrumentation wafer (flight test configuration only), and the RS. The latter four sections make up what is generally referred to as the post-boost vehicle. The missile is approximately 59.9 feet (ft) [18.3 meters (m)] long, with a maximum diameter of 5.5 ft (1.7 m), and weighs approximately 79,400 pounds (lb) [36,000 kilograms (kg)]. Further discussions on key components of the MM III missile are provided in the paragraphs that follow. A diagram of the MM III is provided in Figure 2-1.

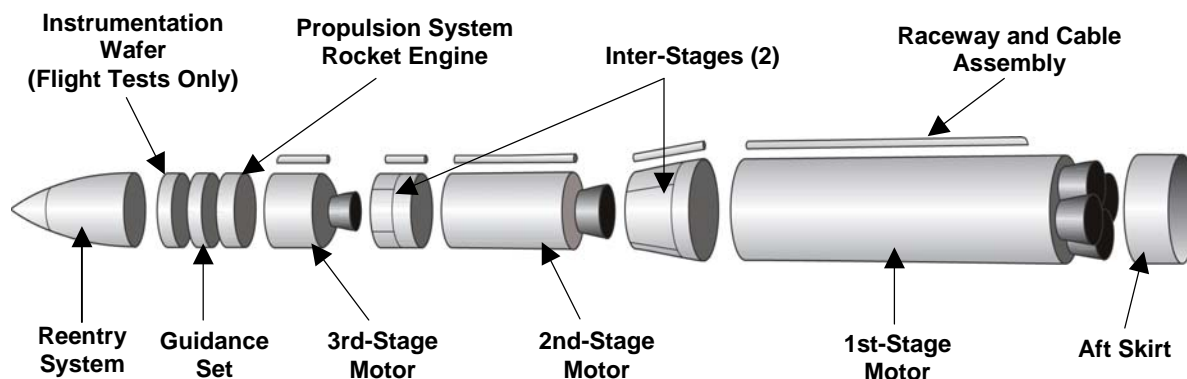


Figure 2-1. Minuteman III Missile

Solid-Propellant Booster

The solid-propellant booster is comprised of the assembled 1st, 2nd, and 3rd stage motors, along with the inter-stages and ordnance systems. Information on the dimensions of each motor—and propellant weight, main chemical components, and DOD explosive classification—is provided in Table 2-1. The DOD classification determines the method of shipping and storing of the rocket propellants and other ordnance (DOD, 1999; USAF, 2001c).

Table 2-1. Solid-Propellant Rocket Motors

Stage	Diameter ft (m)	Length ft (m)	Propellant		
			Quantity (approx.) lb (kg)	Main Chemical Components	DOD Classification
1st	5.5 (1.7)	18.6 (5.7)	45,700 (20,730)	Ammonium Perchlorate Aluminum Polybutadiene-Acrylic Acid-Acrylonitrile	Class 1.3
2nd	4.3 (1.3)	9.1 (2.8)	13,750 (6,240)	Ammonium Perchlorate	
3rd	4.3 (1.3)	5.5 (1.7)	7,300 (3,310)	Aluminum Polybutadiene-Carboxyl Terminated	

Source: Ogden ALC, 2003; USAF, 2001b

During powered flight, each rocket motor uses a different Thrust Vector Control (TVC) system (steering mechanism) for pitch and yaw control. Descriptions of each and the materials they use are as follows:

- **1st Stage.** The TVC system on the 1st-stage motor uses hydraulically actuated, moveable nozzles for altering the thrust vector. Several gallons of hydraulic fluid are contained in the system.
- **2nd Stage.** The TVC is accomplished through the liquid injection of perfluorohexane into the rocket's gas exhaust. Approximately 200 lb (91 kg) of perfluorohexane are used.
- **3rd Stage.** The 3rd stage motor uses a liquid injection TVC system nearly identical in concept to the 2nd-stage system, except that strontium perchlorate is used. The TVC system uses approximately 50 lb (23 kg) of the liquid.

Small amounts of ordnance, in the form of linear explosive assemblies, are used to separate the stages during flight. Other ordnance carried on the three-stage booster includes motor igniter assemblies and an ordnance destruct package, used only for test launches at Vandenberg AFB.

Propulsion System Rocket Engine (PSRE)

Just above the 3rd-stage motor on the MM III is the PSRE. It is a liquid propellant rocket unit consisting of two sealed propellant storage assemblies, a helium gas storage tank for pressurizing the propellant, and several small rocket engines. The propellants used are monomethylhydrazine (CH_6N_2) as the fuel, and nitrogen tetroxide (N_2O_4) as the oxidizer, which form a hypergolic combination. The PSRE is completely assembled and fueled with 13.2 gallons (gal) [50 liters (L)] of fuel and oxidizer each at the time of manufacture. Other ordnance materials within the PSRE contain less than 1 ounce (28 grams) of additional explosives.

Missile Guidance Set and MOD 7 Instrumentation Wafer

Mounted on top of the PSRE are the electronic missile guidance set and the MOD 7 instrumentation wafer (used only for flight tests). The guidance set is an inertial guidance system that directs the flight of the MM III missile. Components within the instrumentation wafer transmit data to track the missile's flight path and evaluate performance, following launch from Vandenberg AFB.

Reentry System (RS)

The payload section on top of the MM III missile is referred to as the RS. Inside of the RS, the Support Payload Bulkhead provides a structural support base for the RVs, and carries the electronics needed to activate and deploy them in flight. A two-piece shroud covers the bulkhead and RVs, protecting them during ascent. The nose cap on top of the shroud contains a small rocket motor containing 6.8 lb (3.1 kg) of solid propellant, which is used to eject the shroud from the vehicle while in flight. Other small quantities of ordnance carried on board the RS include a shroud ejection motor initiator, gas generators, and gas generator initiators, which, when combined, contain less than 1 lb (0.45 kg) of additional explosives.

In its current configuration, the fielded MM III RS employs either the Mark 12 RV or the Mark 12A RV (see Figure 2-2).

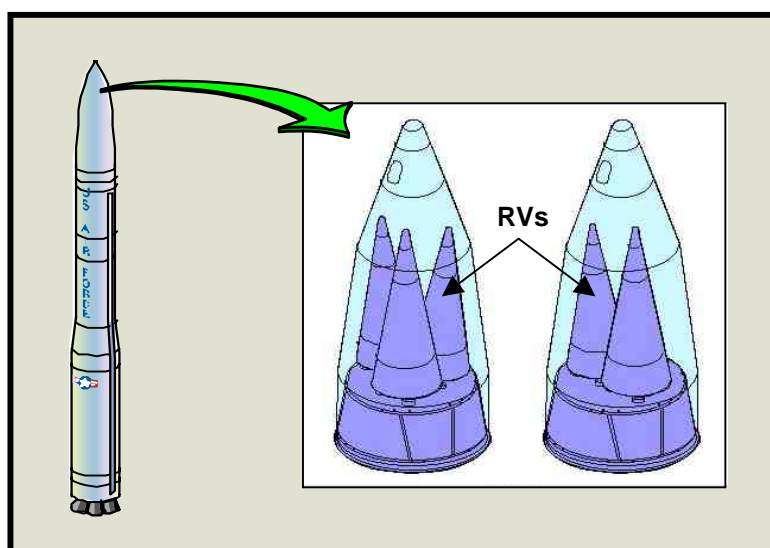


Figure 2-2. Minuteman III Reentry System (Existing)

Batteries

To provide electrical power to the MM III subsystems, several different types of batteries are carried on board the motors, the RS, and other sections of the missile. These include multiple silver-zinc batteries, a single lithium carbon monofluoride battery, and a single lithium silicon/iron disulfide (thermal) battery. Approximately 15 batteries are carried on each MM III flight test missile (depending on the RS configuration used), each weighing from 1 to 21 lb (0.5 to 9.5 kg).

2.1.2 Minuteman Wings

Of the 500 MM III ICBMs currently deployed, 200 are located within the missile Wing at Malmstrom AFB, while 150 each are at FE Warren and Minot AFBs. All of the missiles are widely dispersed in underground, hardened LF silos within the Wing area. For every grouping or “flight” of 10 LFs in the field, there is one manned LCC providing command and control interface with the LFs.

As shown in Figures 2-3 through 2-5, the individual Wings cover broad areas, ranging in size from 8,500 to 12,600 square miles [22,015 to 32,635 square kilometers (km)]. Each polygon on the figures

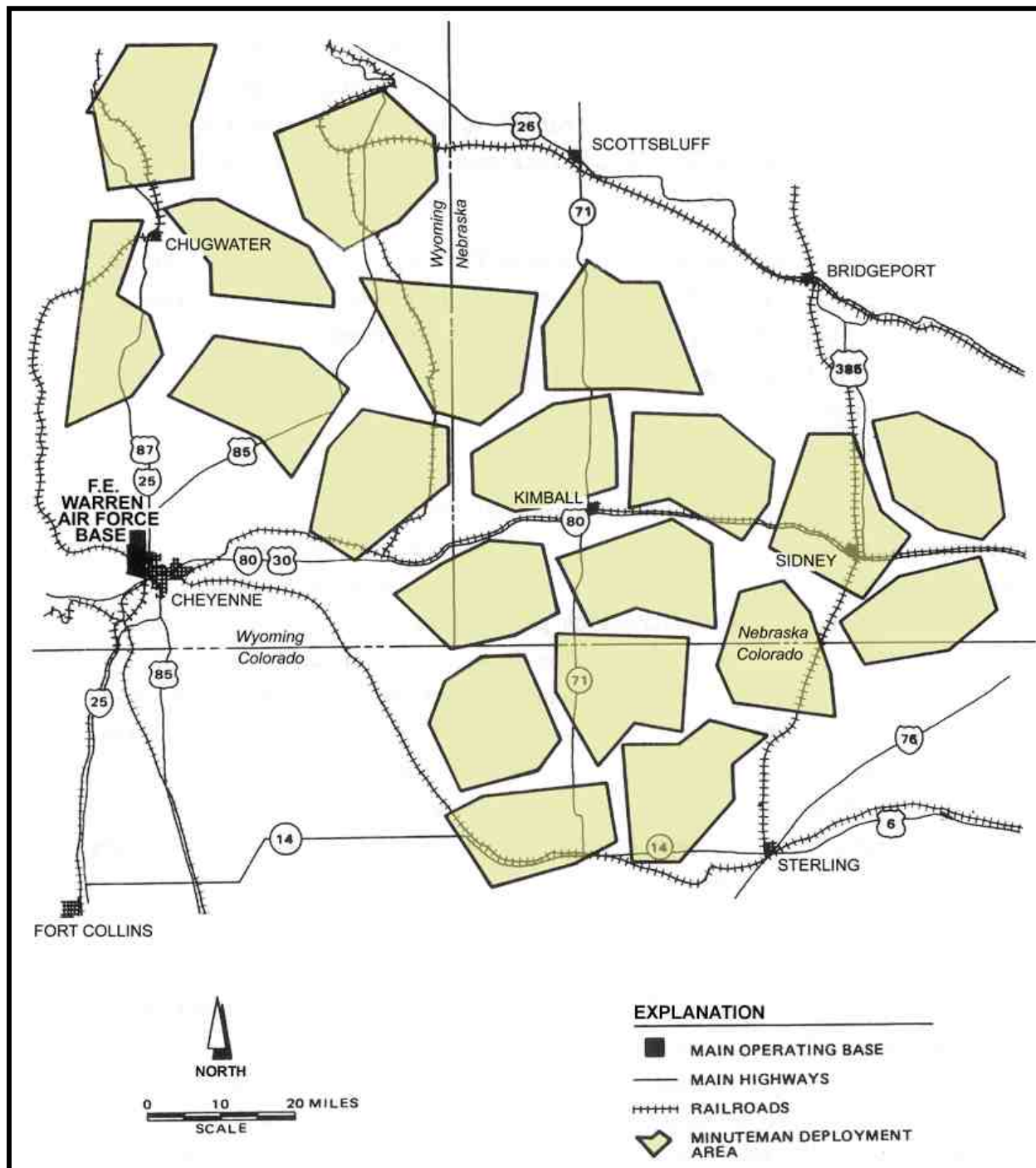


Figure 2-3. Minuteman Wing for FE Warren AFB, Wyoming

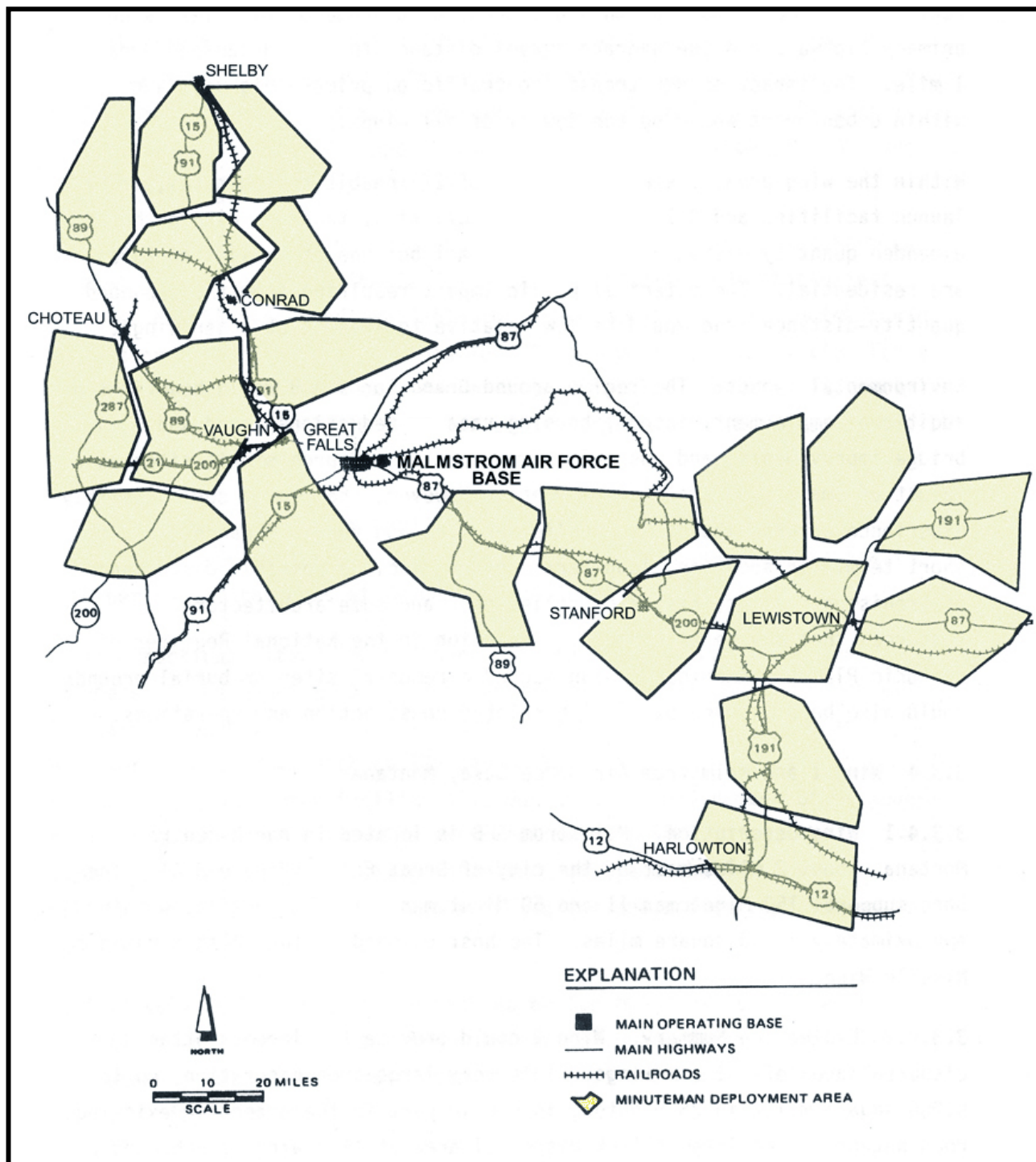


Figure 2-4. Minuteman Wing for Malmstrom AFB, Montana

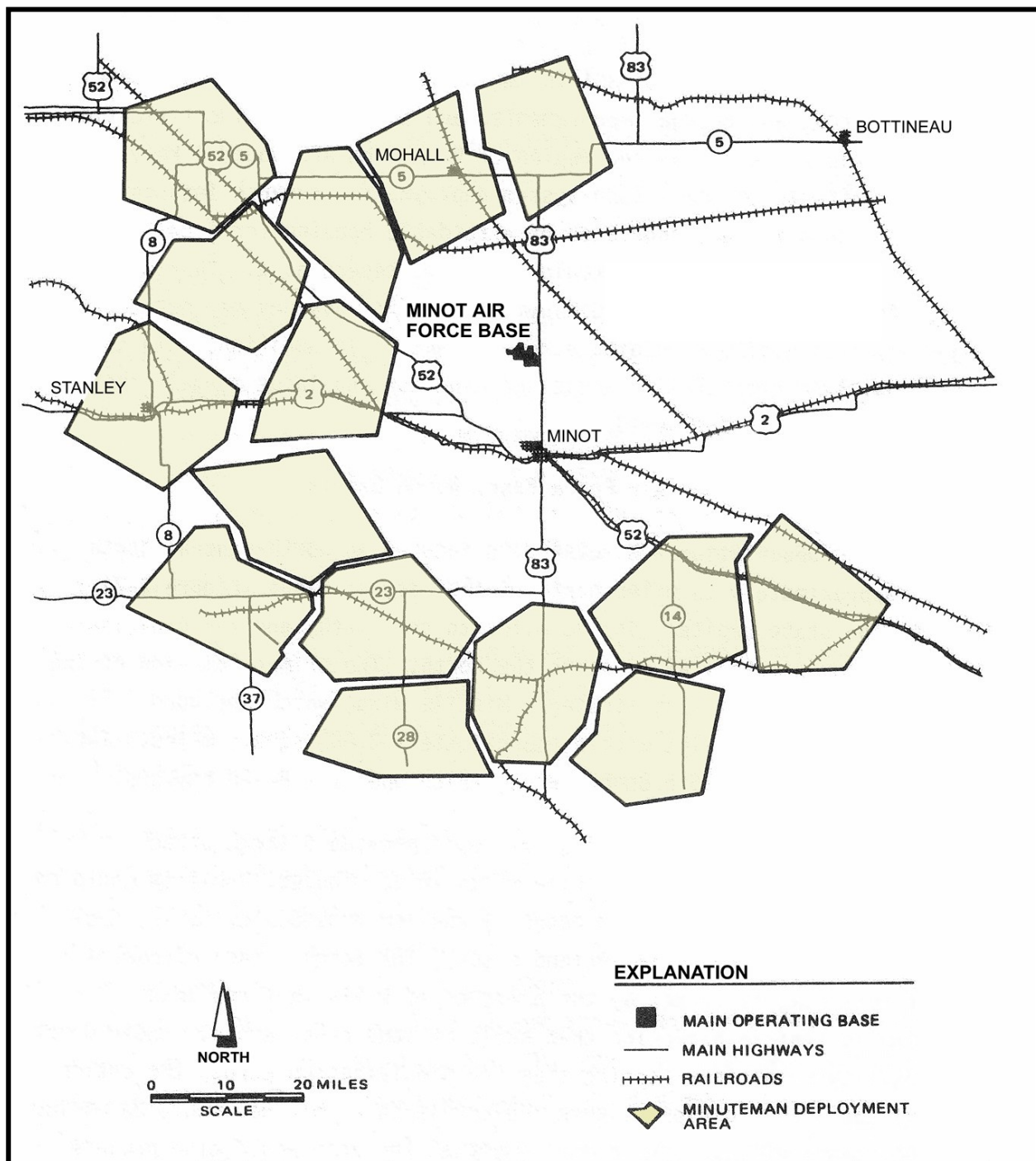


Figure 2-5. Minuteman Wing for Minot AFB, North Dakota

represents an area containing a single “flight” of 10 missile LFs and one LCC. Additional missile maintenance and training facilities are located at each Wing.

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed MM III modification would not be implemented. The RS-related equipment would not be flight tested at Vandenberg AFB, or deployed on the fielded MM III ICBMs at each of the Wings. In addition, the MM III command and control console equipment (hardware and software) upgrades would not be deployed to the LCCs, or to other trainer and support facilities. Command and control operations would continue to use and maintain the existing console equipment, and replace failed units for as long as spares are available.

Through ICBM follow-on test and evaluation programs, ongoing system monitoring and testing of MM III components would continue to ensure weapon system safety, accuracy, and reliability for the remaining life of the MM III system. All of the installations and facilities that would have supported the proposed MM III modification would continue their current operations in support of maintaining the MM III ICBM weapon system. The ICBM follow-on test and evaluation activities for these locations are described in the following sections.

Though not specifically described herein as part of the No Action Alternative, other ongoing and future life-extension programs for the MM III weapon system would continue as planned.

2.2.1 FE Warren, Malmstrom, and Minot Air Force Bases

As part of ongoing operations at the three MM Wings, MM III missiles and/or certain missile components are periodically removed from the remote LFs and transported back to the Wing support base for maintenance, system checks, parts replacement, and occasional system upgrades. If the three-stage solid-propellant booster requires maintenance or motor change-out, or is to be used for flight tests at Vandenberg AFB, then a Transporter Erector (TE) vehicle (Figure 2-6) is brought in to remove the booster from the LF and transport it back to the support base.

At the support base, the intact booster is transferred from the TE to a Missile Transporter (MT) trailer (Figure 2-7) and readied for transport to either Hill AFB or Vandenberg AFB, depending on the actions required. When necessary, the RS and PSRE are transported separately back to the support base. The design of the PSRE is such that its handling and storage does not require the transfer of liquid propellants. If such actions or other maintenance procedures are required, the PSRE is shipped to the depot maintenance facility at Hill AFB. Any maintenance or other work done on the RS is conducted at the Wing support base.

Once the missile maintenance, upgrades, or other parts replacement actions are completed, the MM III components are transported from the support base back to the missile LF, and reinstalled in the reverse order from when they were first pulled.

To safeguard the RS, PSRE, booster, and other ordnance from fire or other mishap, all transportation, handling, and storage of these components would be accomplished in accordance with DOD, USAF, and US Department of Transportation (DOT) policies and regulations. Personnel supporting the ICBM program are regularly trained on missile handling and maintenance procedures using existing trainer facilities.

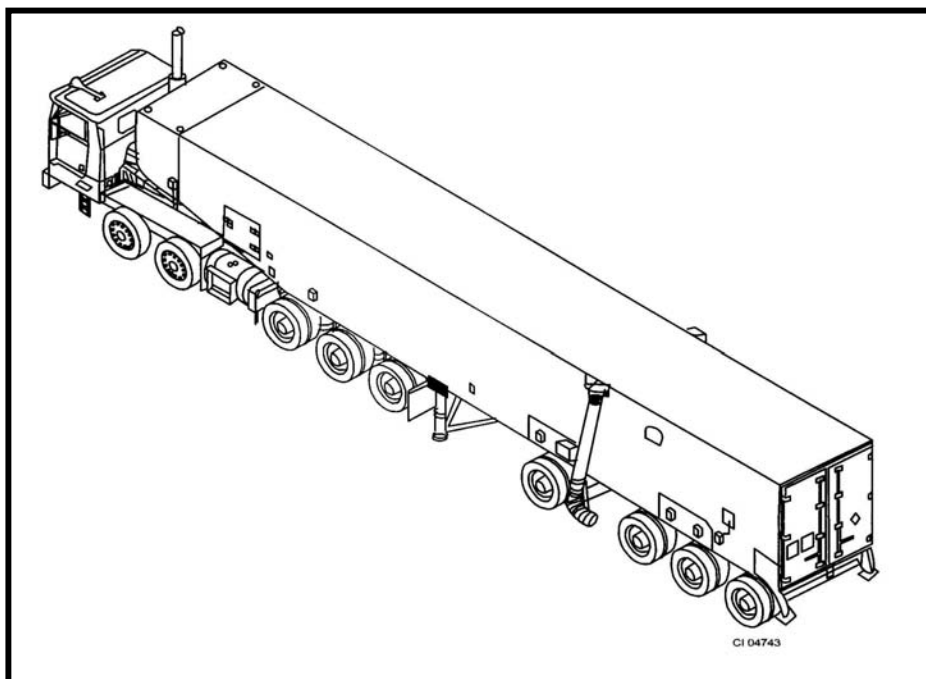


Figure 2-6. Transporter Erector

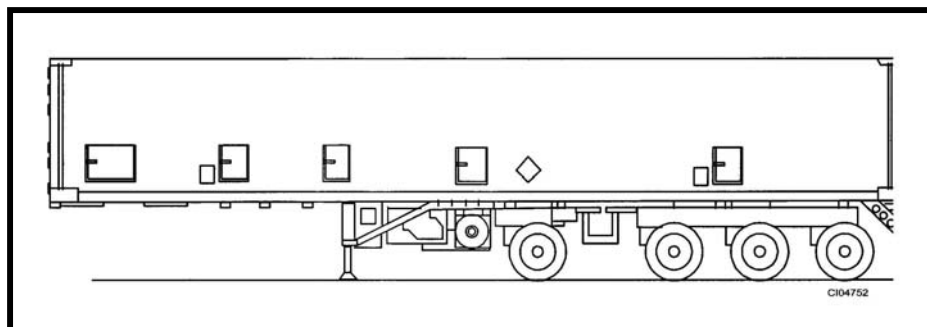


Figure 2-7. Missile Transporter Trailer

At each of the LCCs in the Wing areas, command and control operations, and missile monitoring, continue around the clock, 7 days a week. The console equipment at each LCC, which includes an HDA, VDUs, and an EMAD, is critical to the command and control operations, and interfaces with the silo-based missiles within each “flight.” Similar consoles used for training and maintenance purposes are located on each of the Wing support bases and at other MM III system support locations. Because of aging equipment problems, computer and other electronic console equipment will sometimes fail. Replacement of entire failed units is often the only option, since replacement parts are usually no longer available for equipment repairs. Failed HDA and VDU units that cannot be repaired are declassified and sent to the local or regional Defense Reutilization and Marketing Office (DRMO) for resale, material recycling, and/or disposal as solid or hazardous waste. FE Warren AFB is the only Wing support base without an on-site DRMO. In this case, the failed equipment is turned over to the base supply organization, which then ships it to Fort Carson’s DRMO in Colorado Springs, Colorado.

2.2.2 Hill Air Force Base

Located just south of Ogden, Utah, Hill AFB regularly provides logistics management and repair support for the nation's land-based ICBMs. As part of this effort, MM boosters are disassembled and reassembled at the base to allow for rocket motor inspections and testing for flight worthiness, motor refurbishment, and motor change-outs and upgrades when required. This includes the annual replacement of three to four MM boosters pulled from the Wing LFs for flight tests at Vandenberg AFB, and the supply of other missile components needed for the tests. These actions are considered routine at Hill AFB and are dictated by standard operating procedures.

Most of the rocket motor operations at Hill AFB are conducted within the Missile Assembly Maintenance and Storage area, which is centrally located on base. For each building where motors are involved, Explosive Safety Quantity Distances (ESQDs) are in place to provide explosive hazard buffers between the buildings, and any non-related facilities and roadways nearby. Relatively small amounts of adhesives, sealers, and solvents are used in the booster assembly process.

Also at Hill AFB, the Strategic Missile Integration Complex (SMIC) is used for conducting a variety of tests on ICBM hardware and software components, in addition to providing training support. Just as at the Wings, failed HDA and VDU units in test consoles used at the SMIC, that cannot be repaired, are declassified and sent to the local DRMO on base for resale, material recycling, and/or disposal as solid or hazardous waste.

2.2.3 Vandenberg Air Force Base

The MM III missile is just one of a number of ballistic missiles and space-lift vehicles launched from Vandenberg AFB. As part of ongoing performance testing of the MM III system, Vandenberg AFB regularly conducts three to four MM III FDE launches every year. A comparison of the relative size of the MM III missile to some of the other launch vehicles used at Vandenberg is provided in Figure 2-8.

For each flight test, the USAF randomly selects a MM III missile from one of the three operational Wings. Using the methods previously described in Section 2.2.1, the solid-propellant booster, the PSRE, guidance set, and RS (minus the operational RVs) are shipped separately to Vandenberg AFB in preparation for a launch. An instrumentation wafer for the missile is also shipped to the base from storage at Hill AFB.

Pre-Flight Preparations

Upon arrival at the base, the booster is either placed temporarily in a missile storage bunker, or taken to the Missile Processing Facility (MPF) (Figure 2-9), depending on the launch schedule. After being unloaded at the MPF, the booster undergoes inspections and system checks, and the destruct package is added. The purpose of the destruct package is to terminate motor thrust if unsafe conditions develop during powered flight. The destruct package also contains the logic to detect a premature separation of the booster stages and initiate a thrust termination action on its own. Thrust is terminated by initiation of a linear shaped explosive charge, which splits the motor casing, releasing motor pressure. Usually, no more than four base personnel are involved during this installation process. The ESQDs from the MPF are set between 600 and 1,000 ft (183 and 305 m). These distances are expanded to 2,500 ft (762 m) during Safe and Arm Checks. The typical elapsed time from when the booster arrives at Vandenberg AFB to when the flight test is conducted is 3 to 4 months.

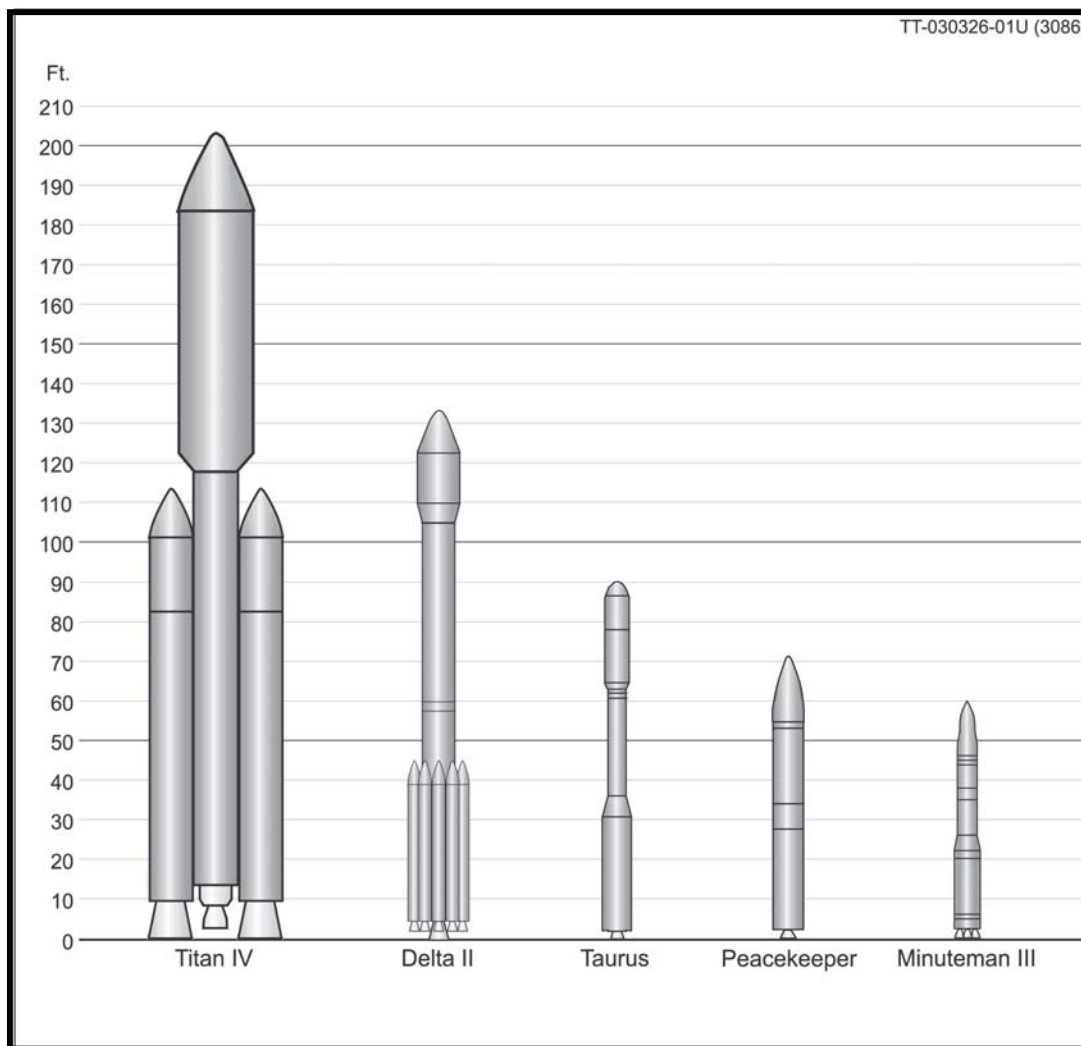


Figure 2-8. Comparison of Launch Vehicles

Once ready, the booster is transported in a TE to the designated LF near the north end of the base, where it is lowered into the underground silo. There are four LF silos at Vandenberg AFB for conducting MM III launches—LFs 04, 09, 10, and 26—which are used on a rotating basis in the launch cycle. The locations of these LFs are shown in Figure 2-9. Once the booster has been placed in the silo, ESQDs similar to those applied to the MPF are established for the LF.

After the booster is readied at the LF, the PSRE is removed from Building 1551 (where it was stored upon arrival at the base), and transported to the designated LF for placement on top of the booster. For safety purposes, Building 1551 has an ESQD of 1,250 ft (381 m) established around it. Following placement of the PSRE on the booster, the guidance set and instrumentation wafer are added.

At Vandenberg AFB, the RS is assembled at the Assembly, Surveillance, and Inspection (AS&I) facility (Munitions Assembly Building), which also has an ESQD of 1,250 ft (381 m) established around it. For the flight tests, the operational RVs that were removed at the Wing are replaced with one, two, or three test RVs. The test RVs serve to simulate operational RVs to help ensure that the weapon system is

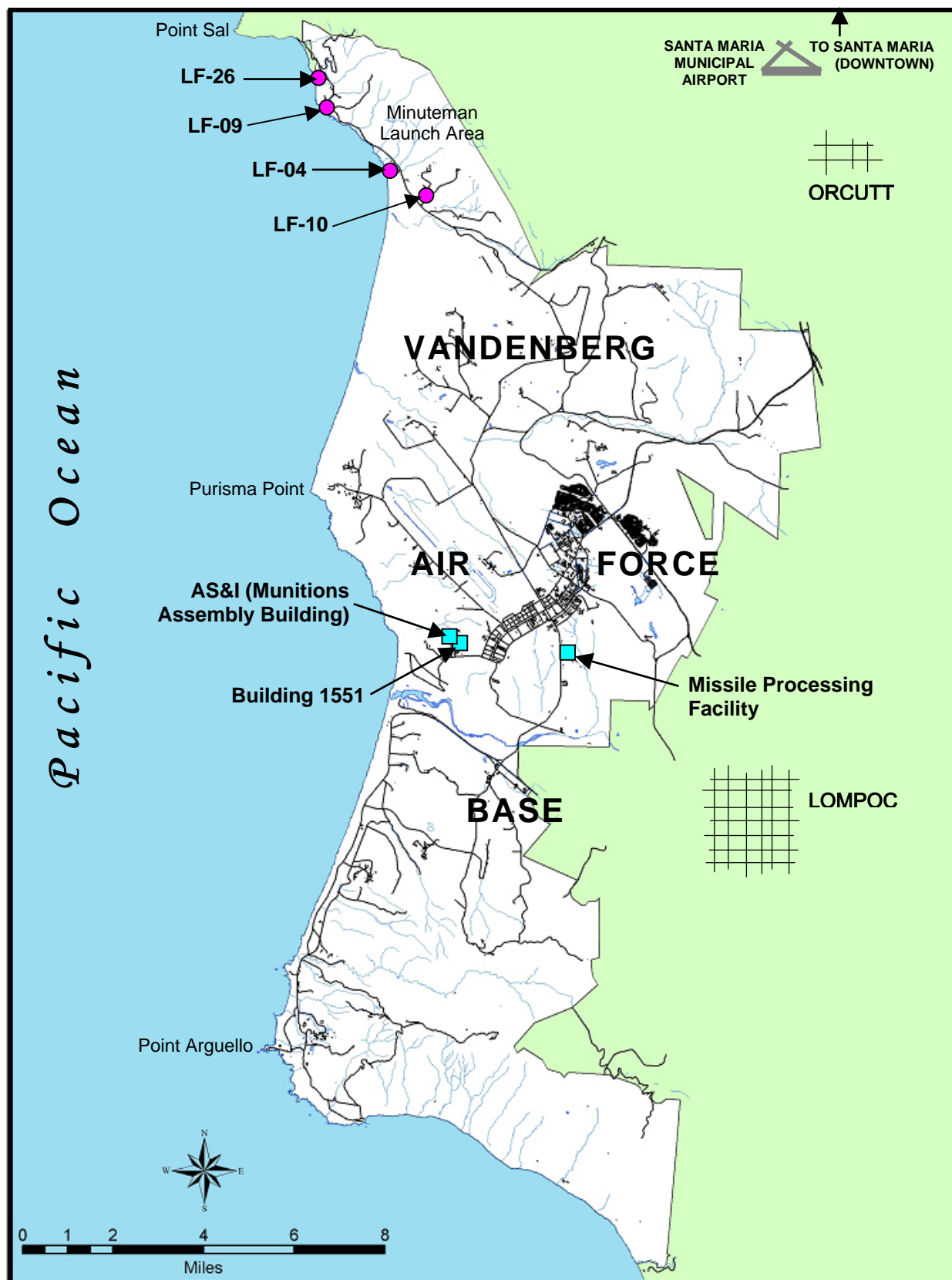


Figure 2-9. Minuteman III Flight Test Support Facilities at Vandenberg AFB, California

functioning correctly. The RV simulators do not contain any fissile materials; however, depending on mission requirements, some of them may contain varying quantities of hazardous materials, including high explosives, beryllium (Be), depleted uranium (DU)¹, and batteries. Such test RVs arrive at the base pre-assembled from the DOE. During assembly of the RS, various pieces of ordnance are installed (e.g., the shroud ejection motor, gas generators, etc.). An insulating sealant is applied to the joining edges of the shroud. Once completed, the RS, containing one to three test RVs, is loaded onto a payload transporter and taken to the LF for placement on top of the MM III booster.

Also, prior to each launch, a protective silicon rubber sealant is manually applied (not sprayed) to cable pass-through holes and other openings along the launch tube walls of the LF. This sealant prevents rocket exhaust gases from damaging the facility.

Flight Activities

Figure 2-10 shows a representative missile flight path and the booster drop zones for a MM III FDE test missile launched from Vandenberg AFB towards USAKA in the Marshall Islands. Following motor burnout and separation, the spent 1st-stage motor will splash down in the Pacific Ocean approximately 110 to 160 mi (180 to 260 km) off the California coast. Following in sequence, the spent 2nd-stage motor will also splash down approximately 870 to 950 mi (1,400 to 1,520 km) off the coast. As the missile travels along a flight path several hundred miles north of the Hawaiian Islands, it will reach an apogee several hundred miles in altitude. Prior to this point, the 3rd-stage motor will have separated from the post-boost vehicle. The spent 3rd-stage motor will travel on a ballistic course, splashing down in the open ocean approximately 60 to 270 mi (100 to 430 km) northeast of the Marshall Islands, as the post-boost vehicle steers the RVs toward designated target points in the vicinity of USAKA.

Prior to conducting each MM III FDE flight test, USAF and contractor personnel conduct a comprehensive safety analysis to determine specific missile launch and flight hazards. As part of this analysis, risks to off-base areas and non-participating aircraft, sea vessels, and personnel are determined. The results of this analysis are used to identify the launch hazard area, expended booster drop zones, post-boost vehicle impact area, and a terminal hazard area for the RVs. A flight termination boundary along the MM III flight path is also predetermined, should a missile malfunction or flight termination action occur. The flight termination boundary defines the limits at which command flight termination would be initiated in order to contain the missile and its debris within predetermined hazard and warning areas, thus minimizing the risk to test support personnel and the general public.

Typical launch hazard areas for each of the four MM III LFs are delineated in Figure 2-11, along with the range of launch trajectories. As part of standard procedures, commercial and private aircraft and watercraft are notified of all the hazard areas several days prior to launch through a Notice to Airmen (NOTAM) and a Notice to Mariners (NOTMAR), respectively. Within a day prior to each launch, radar, helicopters, and other remote sensors are used to verify that the hazard areas are clear of non-mission-essential aircraft, vessels, and personnel. Depending on which of the MM III LFs is used, range safety procedures may require closure of Point Sal State Beach located just north of LF-26—typically for less than a day—and the coordination and monitoring of any train traffic passing through the base.

¹ Natural uranium (U) is a silver-colored metal that is radioactive and nearly twice as dense as lead. Small amounts of U naturally occurring in soil, water, air, plants, and animals contribute to natural background radiation in the environment. DU is a byproduct of the enrichment process used to make weapons grade U-235. DU retains the natural toxicological properties of U, but approximately half of its radiological activity. DU is a non-fissile material.

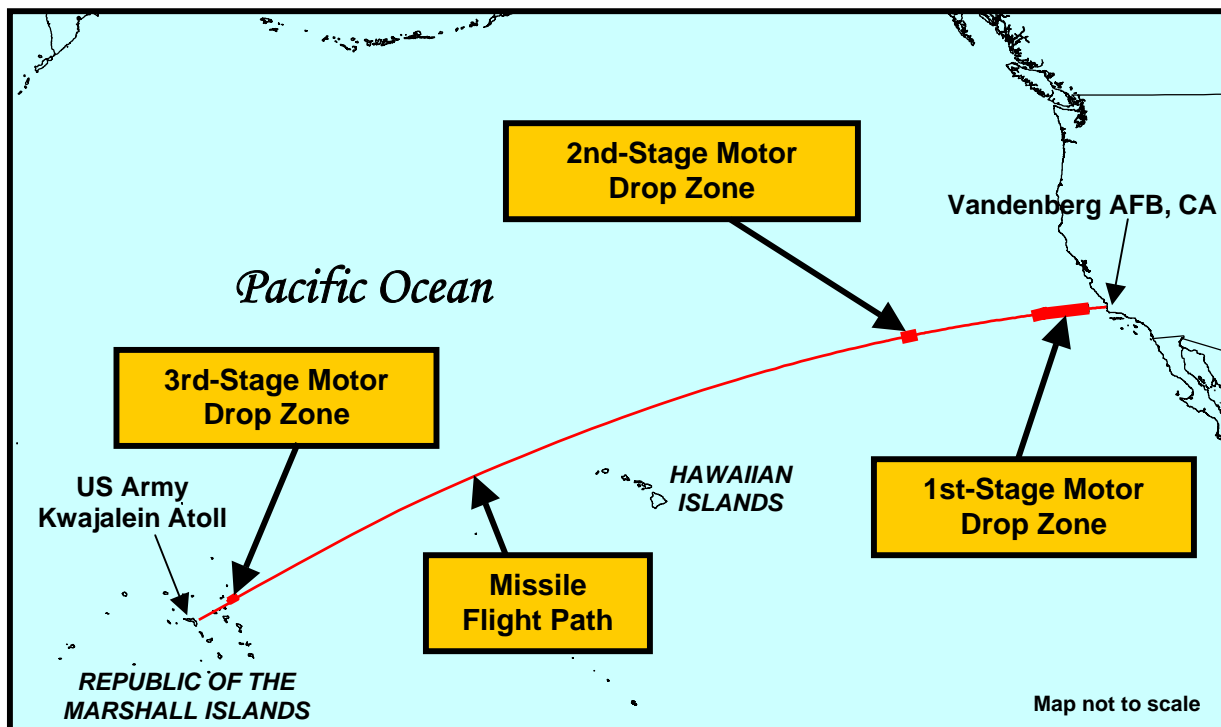


Figure 2-10. Representative Missile Flight Path and Motor Drop Zones for Minuteman III Flight Tests from Vandenberg AFB, California

Should a MM III missile head off course or should other problems occur during flight, the Missile Flight Control Officer would activate the destruct package on the missile. This would stop the vehicle's forward thrust, and the missile would then fall along a ballistic trajectory into the ocean.

Post-Launch Operations

Following each flight test, post-launch refurbishment of the LF is required for the replacement of cables and other damaged components, and the painting of components (e.g., missile suspension system) for corrosion control. In addition, the silicon rubber sealant applied to the tube walls, prior to launch, must be scraped from holes and openings, and collected in a single 55-gal (208-L) drum for disposal as a hazardous waste.

After every four flights, the walls of the launch tube are also hand brushed to remove accumulated blast residues. The residues are swept up and collected in 55-gal (208-L) drums for disposal as hazardous waste.

The expended rocket motors and other missile hardware are not recovered from the ocean following flight tests.

Console Equipment Maintenance

Similar to the MM III Wings, Vandenberg AFB has a number of ICBM command and control consoles used for training, testing, and maintenance purposes. Just as at the Wings, failed HDA and VDU units that cannot be repaired are declassified and sent to the local DRMO on base for resale, material recycling, and/or disposal as solid or hazardous waste.

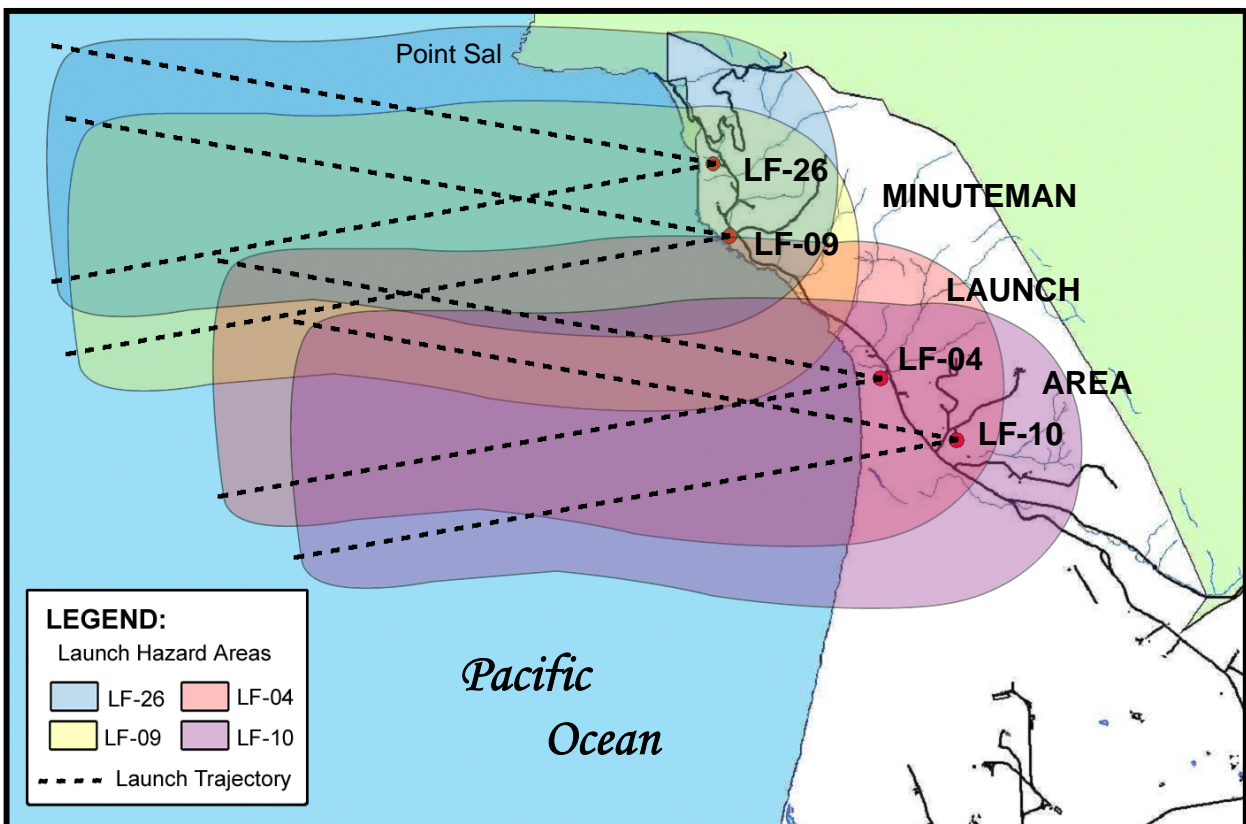


Figure 2-11. Range of Minuteman III Launch Trajectories and Launch Hazard Areas at Vandenberg AFB, California

2.2.4 US Army Kwajalein Atoll

Towards the terminal end of each MM III FDE flight, beyond the 3rd-stage motor drop zone, the post-boost vehicle fragments impact in a predetermined area of the ocean northeast of USAKA in the RMI. The hazard areas for missile impact are shown in Figure 2-12 for a representative MM III flight path. Traveling slightly farther, the one to three RVs (per flight) are targeted towards designated deep ocean areas east of the Kwajalein reef, or in the vicinity of Illeginni Island, depending on mission requirements. Test RVs containing high explosives would be detonated at some altitude (airburst), or upon impact on land or water. RVs that do not contain high explosives would remain intact as they impact land or water at high velocities. Targets are carefully selected to minimize the impact of RV flight tests on threatened and endangered marine mammals, sea turtles, migratory birds, and other marine life; and on the coral reef and island habitats. In particular, areas designated as habitat for species of concern, under the UES, would not be targeted.

To ensure the safe conduct of these types of tests, a Mid-Atoll Corridor Impact Area has been established across USAKA, as is shown in Figure 2-12. When a point of impact is to occur in this area, a number of strict precautions are taken to protect personnel. Such precautions may consist of evacuating nonessential personnel and sheltering all other personnel remaining within the Mid-Atoll Corridor. Just as at Vandenberg AFB, NOTAMs and NOTMARs are published and circulated in accordance with established procedures to provide warning to personnel, including natives of the Marshall Islands, concerning any

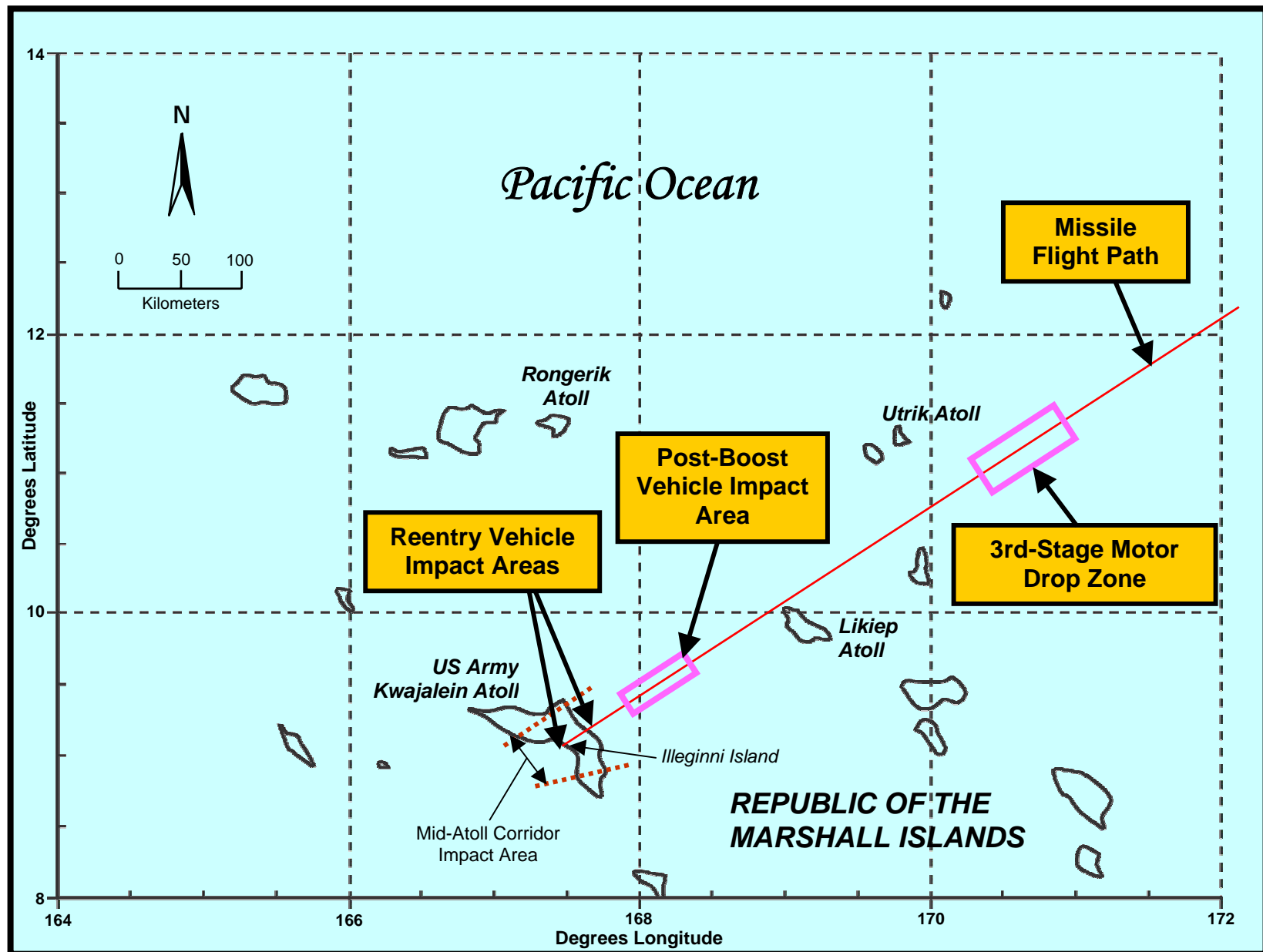


Figure 2-12. Representative Missile Flight Path and Hazard Areas for Minuteman III Tests at US Army Kwajalein Atoll

potential hazard areas that should be avoided. Radar and visual sweeps of hazard areas are accomplished immediately prior to FDE flight tests to assist in the clearance of non-critical personnel. Only mission-essential personnel are permitted in hazard areas.

The Ronald Reagan Ballistic Missile Defense Test Site (RTS) at USAKA supports MM III FDE missions by providing tracking, sensing, and other technical and logistical support. An extensive array of missile tracking radars and optical sensors are located on several of the islands. Depending on mission requirements, other auxiliary sea-based, aircraft-based, and satellite-based sensors (optical and radar systems) may be involved in tracking the missile and collecting data. Test support is provided primarily by existing Government personnel and contractors based at USAKA.

RVs that impact in the ocean beyond shallow waters are not recovered. Debris from those RVs that impact on land or in the atoll lagoon is recovered. Post-test recovery operations at Illeginni Island require the manual cleanup and removal of any RV debris, including hazardous materials (e.g., DU), followed by filling in larger craters using a backhoe or grader. Both Lawrence Livermore National Laboratory (LLNL) and USAKA personnel are usually involved in these operations.

RV recovery/cleanup operations in the lagoon and ocean reef flats, within 500 to 1,000 ft (152 to 305 m) of the shoreline, are conducted similarly to land operations when tide conditions and water depth permit. A backhoe is used to excavate the crater. Excavated material is screened for debris and the crater is usually back-filled with coral ejected around the rim of the crater. When RVs impact in the deeper waters of the atoll lagoon, a dive team from USAKA is brought in to conduct underwater searches. Using a ship for recovery operations, a remotely operated vehicle is first used to locate the debris field on the lagoon bottom. Divers in scuba gear are then able to recover the debris manually.

In general, RV recovery operations are not attempted in deeper waters on the ocean side of the atoll. Searches for debris would be attempted out to depths of 50 to 100 ft (15 to 30 m). An underwater operation similar to a lagoon recovery would be used if debris were located in this area.

The potential impacts resulting from these types of ICBM tests at USAKA—including RV impacts in the vicinity of Illeginni Island—have been previously analyzed in the *Environmental Assessment for Department of Energy (DOE) Reentry Vehicles, Flight Test Program, US Army Kwajalein Atoll, Republic of the Marshall Islands* (USAF, 1992a), which is summarized in Appendix A.

2.3 PROPOSED ACTION

The RS Modifications would require hardware and software modifications to existing cables, mounting hardware, connectors, testers, and trainers at LFs located within the three MM Wings, and at several other USAF and contractor facilities supporting MM III operations. The activities would include development and implementation of the following items:

- New and modified RS hardware to mount the Mark 21 RV
- New RS electronic signal generator
- Changes to software programs and data collection systems
- Modifications to system test and evaluation hardware/software
- Modifications to personnel training hardware and software packages
- Flight test and evaluation of the modified MM III missile.

Console equipment activities would involve the replacement of MM III command and control console equipment, and related software upgrades, at all operational LCCs located within the three MM Wings,

and at several other USAF and contractor facilities supporting MM III ICBM operations. The program activities can be broken down into three main efforts:

- Replacement of the mechanical HDA (a high-capacity computer hard disk), with a sealed solid-state design
- Replacement of the cathode ray tube (CRT) technology VDUs with more modern units (e.g., liquid crystal displays)
- Upgrade of the COP software and replacement of the EMAD module with a unit having more internal memory.

The RS-related activities would be multi-phased, involving system development, testing, and deployment activities, while the console equipment requires only deployment. For analysis purposes, the Proposed Action is divided into a flight test and evaluation phase for the modified RS, a deployment phase for the RS modification kits and Mark 21 RVs, and additional deployment-related activities associated with the new console equipment. These actions are described in the following sections.

2.3.1 Flight Test and Evaluation of the Reentry System Modification


MM III flight tests involving use of the modification hardware/software would be conducted at Vandenberg AFB. The purpose of the initial flight tests is to resolve technical issues and identify any areas of risk associated with the proposed MM III modification. Continuation of the FDE flight test program (described earlier in Section 2.2.3) would serve to ensure system safety, gather information to support accuracy and reliability estimates, and verify the ability of the system to meet ICBM mission requirements on a long-term basis.

Flight test operations would be conducted in a manner similar to that described for the No Action Alternative in Section 2.2.3, and would occur from the same four LFs previously identified for these types of tests (see Figure 2-9). No facility modifications or construction would be required at Vandenberg AFB for these flight tests. Approximately 45 existing Vandenberg AFB personnel would be involved in missile handling and post-launch operations at the base. Just as on prior FDE flights, some of the proposed test RVs may contain varying quantities of hazardous materials including high explosives, Be, DU, and batteries.

Along with the normal FDE launches, four additional flight tests would be conducted within the June and August 2005, and February and September 2006, timeframes to verify system operation and certify the modified weapon system. Operations for the modified FDE flights would be conducted in the same manner as for current FDE launches. Table 2-2 shows the MM III launch rates planned to occur through 2010.

At the terminal end of each flight, the post-boost vehicle fragments would impact in the open ocean northeast of USAKA. Traveling slightly farther, the RVs would impact east of the Kwajalein reef or in the vicinity of Illeginni Island, within the Mid-Atoll Corridor Impact Area—the same general areas now used for FDE flights (Figure 2-12). Targets would be carefully selected to minimize the impact of RV flight tests on threatened and endangered marine mammals, sea turtles, migratory birds, and other marine life; and on the coral reef and island habitats. In particular, areas designated as habitat for species of concern, under the UES, would not be targeted. Similar tracking, sensing, RV recovery, and other technical and logistical support, as previously described for the No Action Alternative in Section 2.2.4, would be provided for these flight tests.

Table 2-2. Planned MM III Launch Rates for Vandenberg AFB, California							
Planned Actions	MM III Launches per Fiscal Year						
	2004	2005	2006	2007	2008	2009	2010
Current FDE Flights	3	3	3	1	0	0	0
Modified FDE Flights	0	0	0	3	4	4	4
Additional Flight Tests	0	2	2	0	0	0	0
Total Flights Planned	3	5	5	4	4	4	4

 = Tests incorporate RS modification kits and software upgrades, and the newer Mark 21 RV simulators or Mark 12A RV simulators. All other tests utilize older Mark 12- or 12A-related hardware/software.

In conjunction with each flight test, a replacement MM III booster would be assembled at Hill AFB and shipped to the applicable MM Wing for purposes of reactivating the affected LF. This particular action would be conducted in the same manner as previously described for the No Action Alternative in Sections 2.2.1 and 2.2.2.

2.3.2 Deployment of Reentry System Modification Kits and Mark 21 Reentry Vehicles

As described under Section 2.3, deployment efforts would include new and modified hardware for MM III RSs. The RS modification kits (including hardware for mounting Mark 21 RVs on the RS, and new electronic flight equipment), new support equipment, new and modified software, and modifications to training hardware would be shipped directly from existing contractor facilities to the MM III Wings, Vandenberg AFB, and Hill AFB starting in late 2006. Deployment of the RS modification kits onto fielded missiles at the Wings would begin in 2006 and continue through 2011, when Full Operational Capability would be reached.

At each operational LF, USAF personnel would remove the currently deployed RS from the missile and transport it back to the Wing support base for modifications using methods similar to those previously described for the No Action Alternative in Section 2.2.1. Existing base personnel would then perform system modifications, involving the replacement of RVs, RS attachment hardware, and a new electronic signal generator, before reinstalling the modified RS at the LF.

Under current USAF planning, all of the MM III RSs would receive the proposed modification to accommodate either the Mark 21 RV or the current Mark 12A RV. The US Air Force Space Command would determine the specific quantities and configurations of RVs at each missile Wing. In addition to deployment of the newer Mark 21 RVs, the older Mark 12 RVs would be removed from the operational MM III ICBM force. The long-term storage and/or disposition requirements for the Mark 12 RVs, however, represent separate actions that are not part of the proposed MM III modification.

No facility modifications or new construction would be required for these deployment activities. Once deployed, the modified RS would have little or no change to existing maintenance, sustainment, and logistics procedures for personnel and facilities.

2.3.3 Deployment of New Console Equipment

As previously described, the MM III command and control modifications involve the replacement of console equipment, and related software upgrades, at all operational LCCs located within the FE Warren AFB, Malmstrom AFB, and Minot AFB missile Wings. The replacement of console equipment and software upgrades would also occur at various trainer and support facilities at each Wing support base, Hill AFB, Vandenberg AFB, and at other USAF/contractor locations.²

Generally, the HDA, VDU, and EMAD modifications would be performed on each console. A breakdown of the approximate number of new console equipment components to be deployed, by location, is provided in Table 2-3. Also shown in the table is the lifetime supply of spares for selected components. At each location, new components would be stored in existing facilities until needed.

Table 2-3. Quantities of New Console Equipment to be Deployed				
Deployment Location	VDU	HDA	EMAD	COP
FE Warren AFB, WY	68	16	15	17
Malmstrom AFB, MT	92	21	20	22
Minot AFB, ND	68	16	15	17
Vandenberg AFB, CA	42	6	5	7
Hill AFB, UT	10	6	12	6
Other Deployment Locations	10	5	2	5
Spare Units	44	120	20	-
Total Units	334	190	89	74

Note: Quantities shown are approximate.

Console equipment deployment at all trainer units would be completed in 2005. Operational facilities would likely receive the COP upgrade and replacement EMAD modules in 2006. Deployment of the remaining HDAs and VDUs would occur as part of routine maintenance, or by forced deployment over a 3-year period beginning at the end of 2005 or 2006. Generally, no more than two or three personnel would be required for the equipment change-out at each console location.

Following each console upgrade, the old VDUs and HDA would be declassified and turned over to the local or regional DRMO for resale, material recycling, and/or disposal as solid or hazardous waste. The old EMAD module would be placed in storage and would not undergo disposal. FE Warren AFB is the only Wing support base without an on-site DRMO. In this case, the failed equipment would be turned over to the base supply organization, which then ships it to Fort Carson's DRMO in Colorado Springs. Approximate numbers of old VDUs and HDAs to be processed at DRMOs are listed by location in Table 2-4.

As an alternative for DRMO processing, a few of the old HDAs and VDUs could be considered for placement in the USAF Museum Program. This would allow such items to be given to one or more receiving Air Force Museums across the country for historical displays and interpretive collections.

² Because the number of new console equipment components going to "other" individual USAF and contractor deployment locations is minimal (see Table 2-3), no further environmental analyses of those sites are necessary.

Table 2-4. Quantities of Old Console Equipment Planned for Defense Reutilization and Marketing Office Processing		
DRMO Location	VDU	HDA
Fort Carson, CO (for FE Warren AFB, WY)	78	24
Malmstrom AFB, MT	103	29
Minot AFB, ND	78	24
Vandenberg AFB, CA	44	13
Hill AFB, UT	25	79
Total Units	328	169

Note: Quantities shown are approximate.

2.4 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

As an alternative for the proposed Mark 21 deployment on MM III ICBMs, a Mark 12 RV life-extension program was considered, but eliminated as unreasonable because of excessive costs for implementing such a modification.

Though computer simulations, modeling, and other laboratory tests are used during the design and early evaluation of the MM III modification, such methods cannot provide all of the information needed to ensure that the MM III weapon system is functioning correctly. Thus, an alternative relying solely on such methods was deemed unreasonable.

No other reasonable alternative sites for conducting MM III launches were identified. Other than Vandenberg AFB, there are no other alternative launch sites within the United States and its territories that can perform MM III launches using existing facilities in a safe and secure operational-like manner. Also, USAKA is the only reasonable alternative location that is capable of tracking and monitoring RV impacts, and that can provide adequate safety and security for such missions. For potential RV land impacts, Illeginni Island is the only leased property within USAKA that does not have critical range instrumentation vulnerable to damage from such tests. Eliminating the vicinity of Illeginni Island as a target area would eliminate the few opportunities to photograph such impacts (using remote-controlled equipment) and to recover RV fragments, both of which can provide important information on weapon system performance.

Consideration was also given to a reduced number of flight tests from Vandenberg AFB. The four flight tests planned in 2005 and 2006, however, represent the minimum number of added flights necessary to validate and certify the proposed MM system modifications.

For the command and control console equipment modifications, other HDAs and VDUs were considered, but were found to be unreasonable because they did not meet form, fit, and function requirements associated with the existing MM III consoles. The replacement components must be comparable to the existing units, and they must employ logistically supportable technologies.

2.5 COMPARISON OF ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

Table 2-5 presents a comparison of the potential environmental consequences of the Proposed Action and the No Action Alternative for those locations and resources affected. A detailed discussion of these potential impacts is presented in Chapter 4.0 of this EA.

Table 2-5. Comparison of Potential Environmental Consequences		
Locations and Resources Affected	No Action Alternative	Proposed Action
FE Warren Air Force Base, WY; Malmstrom Air Force Base, MT; and Minot Air Force Base, ND		
Health and Safety	By adhering to established and proven safety standards and procedures, the level of risk to military personnel, contractors, and the general public should be minimal. Regarding rocket motor transportation over public roads, accident rates for ongoing operations have historically been very low (e.g., 0.000002 accidents per mile for USAF vehicles driven within the FE Warren AFB Wing area). Thus, no significant impacts to public or occupational health and safety are expected to occur.	Missile handling and transportation operations would be conducted in the same manner as for the No Action Alternative, and RS modifications would be conducted during normal ongoing maintenance operations. Thus, Proposed Action activities would not substantially alter the findings identified for the No Action Alternative; namely, that no significant impacts to public or occupational health and safety are anticipated.
Hazardous Materials and Waste Management	All hazardous materials would be managed in accordance with well-established policies and procedures. Hazardous wastes would be properly disposed of, in accordance with all Federal, state, local, DOD, and USAF regulations. Each installation has a plan in place that provides guidelines and instructions to prevent and control accidental spills of hazardous materials. Appropriate permits are also in place and workers are trained. Hazardous material and waste handling capacities would not be exceeded, and management programs would not have to change. Consequently, no adverse impacts from the management of hazardous materials and waste are expected.	The same policies, procedures, and regulations followed under the No Action Alternative would apply. Hazardous material and waste handling capacities would not be exceeded, and management programs would not have to be changed. Thus, no adverse impacts from the management of hazardous materials and waste are expected.
Hill Air Force Base, UT		
Health and Safety	MM III booster operations are routine activities at Hill AFB. By adhering to established and proven safety standards and procedures, the level of risk to military personnel, contractors, and the general public would be minimal. Consequently, no significant impacts to public or occupational health and safety are expected.	The Proposed Action activities would not substantially alter the findings identified for the No Action Alternative; namely, that no significant impacts to public or occupational health and safety are anticipated.
Hazardous Materials and Waste Management	All hazardous materials would be managed in accordance with well-established policies and procedures. Hazardous wastes would be properly disposed of, in accordance with all Federal, state, local, DOD, and USAF regulations. The base has a plan in place that provides guidelines and instructions to prevent and control accidental spills of hazardous materials. Appropriate permits are also in place and workers are trained. Hazardous material and waste handling capacities would not be exceeded, and management programs would not have to change. Consequently, no adverse impacts from the	The same policies, procedures, and regulations followed under the No Action Alternative would apply. Hazardous material and waste handling capacities would not be exceeded, and management programs would not have to be changed. Thus, no adverse impacts from the management of hazardous materials and waste are expected.

Table 2-5. Comparison of Potential Environmental Consequences

Locations and Resources Affected	No Action Alternative	Proposed Action
	management of hazardous materials and waste are expected.	
Vandenberg Air Force Base, CA		
Air Quality	Although rocket motor exhaust emissions would be released in the lower atmosphere, they would be rapidly diluted and dispersed by prevailing winds. No violation of air quality standards or health-based standards for non-criteria pollutants is anticipated. When compared to the amount of emissions released on a global basis, the flight tests will not be statistically significant in contributing to cumulative impacts on the stratospheric ozone layer. Overall, no significant impacts to air quality would occur.	Proposed Action activities would not substantially alter the findings identified for the No Action Alternative. A review of the General Conformity Rule resulted in a finding of presumed conformity with the State Implementation Plan. Additionally, no changes to existing or new air emission permits are required. As a result, no long-term adverse impacts are anticipated.
Noise	MM III launches would generate noise levels ranging from 125 dB (unweighted) in the immediate vicinity of the launch site, to around 105 dB (unweighted) or lower in some populated areas off base. While these noise exposure levels can be characterized as very loud, they would occur infrequently, are very short in duration (about 20 seconds per launch), and would have little effect on the Community Noise Equivalent Level off base. Sonic booms generated by the missile flights would occur down range, some 25 nautical miles downrange of the launch site, and thus would not affect coastal land areas. As a result, no significant impacts to the noise environment would occur.	An increase in flight test operations for a 2-year period would not substantially alter the findings identified for the No Action Alternative; namely, that no significant impacts to the noise environment would occur.
Biological Resources	<p>Exposure to short-term noise from MM III launches and helicopter overflights could cause startle effects in marine mammals and migratory birds. However, a NMFS incidental "take" permit is in place that authorizes incidental harassment of pinnipeds. Helicopter overflights are required to maintain minimal distances away from protected seal haul-outs/rookeries and bird roosting/nesting areas. Studies have shown that it is unlikely for the launch noise exposures documented to date to present a serious risk to seal hearing. On the basis of prior monitoring studies, the NMFS has determined that rocket launch activities have a negligible impact on marine mammal populations and stocks at Vandenberg AFB.</p> <p>Launch emissions have the potential to acidify nearby surface waters. However, surface water monitoring conducted for larger launch systems at Vandenberg AFB has not shown long-term acidification of surface waters. Because the MM III represents a smaller launch system producing fewer emissions, the potential for adverse effects is minimal. In addition, the constant deposition of acid-neutralizing sea salt would reduce the acidification of surface waters.</p> <p>The probability for an aborted MM III launch to occur is extremely low. If an early abort were to occur, base actions would immediately be taken to recover and</p>	An increase in flight test operations for a 2-year period would not substantially alter the findings identified for the No Action Alternative; namely, that no long-term adverse impacts are anticipated.

Table 2-5. Comparison of Potential Environmental Consequences

Locations and Resources Affected	No Action Alternative	Proposed Action
	<p>cleanup unburned propellant and any other hazardous materials that had fallen on the beach or in shallow waters. Any propellant falling into the offshore waters would be subject to continual mixing and dilution due to the ocean waves and currents, and hence, local accumulation of perchlorates contained in the propellants is unlikely. As a result, no significant impacts on biological resources would be expected.</p> <p>Some temporary distress to vegetation near the launch site from launch emissions can be expected, but no long-term adverse effects would occur.</p>	
Health and Safety	Safety procedures and practices at the base are well developed and constantly in use. Notices to mariners and airmen are published in advance to warn of launch hazard areas to be avoided. In addition, detailed flight safety analyses are conducted prior to each mission. As a result, no significant impacts to public or occupational health and safety are anticipated.	An increase in flight test operations for a 2-year period would not substantially alter the findings identified for the No Action Alternative. Thus, no significant impacts to public or occupational health and safety are anticipated.
Hazardous Materials and Waste Management	All hazardous materials would be managed in accordance with well-established policies and procedures. Hazardous wastes would be properly disposed of, in accordance with all Federal, state, local, DOD, and USAF regulations. The base has a plan in place that provides guidelines and instructions to prevent and control accidental spills of hazardous materials. Appropriate permits are also in place and workers are trained. Hazardous material and waste handling capacities would not be exceeded, and management programs would not have to change. Consequently, no adverse impacts from the management of hazardous materials and waste are expected.	The same policies, procedures, and regulations followed under the No Action Alternative would apply. Hazardous material and waste handling capacities would not be exceeded, and management programs would not have to be changed. Thus, no adverse impacts from the management of hazardous materials and waste are expected.
Over-Ocean Launch Corridor		
Biological Resources	<p>Sonic boom overpressures from MM III launch vehicles could be audible to protected marine species underwater. Underwater pressure waves generated by the sonic booms are expected to be less than 140 dB, which is well below the lower limit (178 dB) for inducing behavioral reactions, and the lower limit (218 dB) for inducing temporary threshold shift (TTS) in marine mammals and sea turtles, all sound pressure levels being referenced to 1 micro Pascal (μPa). Because the resulting pressures would be relatively low, and very short in duration, no long-term adverse effects are anticipated.</p> <p>For marine animals, the potential exists for direct contact or exposure to underwater shock/sound waves from the splashdown of spent rocket motors. However, in the open ocean, the probability of impacting protected marine mammals or sea turtles is insignificant based on statistical analyses. The MM III flight tests would occur only a few times per year, and motor impacts from each flight would likely not occur</p>	An increase in flight tests for a 2-year period would not substantially alter the findings identified for the No Action Alternative; namely that no long-term adverse impacts are anticipated.

Table 2-5. Comparison of Potential Environmental Consequences

Locations and Resources Affected	No Action Alternative	Proposed Action
	<p>at the exact same locations. As a result, the impacts of spent rocket motors are not expected to cause any long-term adverse effects on marine mammals or sea turtles in the open ocean.</p> <p>Residual amounts of battery electrolytes, hydraulic fluid, propellants, and other materials could lead to the contamination of seawater. However, the risk of marine life coming in contact with, or ingesting, toxic levels of solutions is not considered significant because of the rapid dilution of any contaminants, and the rapid sinking of any contaminated components.</p>	
US Army Kwajalein Atoll		
Biological Resources	<p>The brief sonic boom overpressures associated with RV flights [estimated at 91 to 150 dB (referenced to 20 μPa)] are likely to cause startle effects in migratory birds on some islands of the Kwajalein Atoll, but the birds are not expected to abandon nests. At Illeginni Island, the migratory bird population appears to be stabilized, if not increasing, even after years of RV tests in the area. The sonic booms could also affect marine mammals and sea turtles underwater. However, at 117 to 176 dB (referenced to 1 μPa), the resulting underwater pressures would fall just below the lower limit for inducing behavioral reactions (178 dB referenced to 1 μPa), and well below the lower limit for inducing TTS (218 dB referenced to 1 μPa) in such animals. Because the resulting pressures would be relatively low, and very short in duration, no long-term adverse effects are anticipated.</p> <p>Like the spent MM III rocket motors, an RV impacting in the ocean or Kwajalein Atoll lagoon would result in underwater shock/sound waves, but with much higher pressure-levels being generated. At distances within a few thousand yards of an RV impact point, underwater pressure levels could induce behavioral reactions (e.g., abrupt movements, changes in surfacing, and sudden dives) in marine mammals, and possibly sea turtles. If they occur, such reactions would last for a very brief period and not result in any long-term effects. At a distance of 128 ft (39 m) from the RV splashdown site, TTS could begin to occur; and within several feet of the impact point, the pressure levels could prove to be fatal to these animals. However, the number of groups (small pods or schools) of these animals to be struck or exposed to harmful underwater shock/sound waves is estimated to be no higher than 0.000003 to 0.000009 per RV test event, depending on the number of RV simulators carried on the launch vehicle. The risk of physically injuring or killing the animals is extremely low in view of the facts that: (1) only 3 to 4 MM III launches would be conducted every year, (2) RV target locations are not always the same, and (3) the probability of impact on marine mammals and sea</p>	An increase in RV flight tests for a 2-year period would not alter the findings identified for the No Action Alternative. Targets are normally selected to minimize damage to protected reef areas and identified wildlife habitats. As a result, no long-term significant impacts are anticipated in Kwajalein lagoon or in the vicinity of Illeginni Island. Additionally, no long-term adverse impacts are expected for ocean areas near Kwajalein Atoll.

Table 2-5. Comparison of Potential Environmental Consequences

Locations and Resources Affected	No Action Alternative	Proposed Action
	<p>turtles caused by underwater shock/sound waves is insignificant.</p> <p>In the event that an RV would directly impact on Illeginni Island or in the shallow coral reefs of Kwajalein Atoll, a crater would form. Post-test recovery and cleanup operations on Illeginni would also cause some short-term disturbance. Such impacts could potentially result in the loss of some protected migratory birds, mollusks, sponges, corals, and other marine life; and damage small areas of migratory bird habitat, sea turtle nesting habitat, and coral reef habitat; all of which represents an irreversible or irretrievable commitment of resources. However, wildlife populations and habitat conditions would be expected to recover. Surveys have shown that bird populations and the local reef environment appear to be thriving after years of RV testing. Because the frequency of such occurrences is very low (estimated to be four to five instances over a 20-year period) and the amount of area affected would be minimal, no long-term significant impacts are anticipated.</p> <p>Following an airburst or ocean/lagoon impact by a test RV, the resulting debris would disseminate any on-board hazardous materials around the impact point and some distance downwind. However, the Be and DU particles or fragments deposited by some RVs are very insoluble, and the dilution and mixing of the ocean and lagoon are so great that the concentration in water would be no different than natural background levels. For impacts on Illeginni Island, there is the potential for migratory birds to breath respirable dust particles of Be and DU, or consume particles deposited on vegetation. However, the relatively short-term exposures immediately following each test are unlikely to result in significant accumulations, particularly when considering the small amount of unrecovered material that may persist in the environment. As a result, no long-term significant impacts are anticipated.</p>	
Cultural Resources	<p>Given the extremely limited potential for any remaining traditional/ prehistoric remains on Illeginni Island, the likelihood of impacts to any resources must be considered either non-existent or extremely low. Though several buildings on the island are of the Cold War era, they currently do not meet RMI criteria for historic significance. Additionally, there is a low probability for the buildings to be impacted by RV tests. As a result, little or no impacts to cultural resources are expected.</p>	<p>An increase in RV flight tests for a 2-year period would not alter the findings identified for the No Action Alternative. Thus, no significant impacts to cultural resources are anticipated.</p>
Health and Safety	<p>Safety procedures and practices at USAKA are well developed. Notices to mariners and airmen are published and circulated to provide advance warning to personnel and natives of the Marshall Islands concerning any potential hazard area that should be</p>	<p>An increase in RV flight tests for a 2-year period would not alter the findings identified for the No Action Alternative. Thus, no significant impacts to public or occupational</p>

Table 2-5. Comparison of Potential Environmental Consequences

Locations and Resources Affected	No Action Alternative	Proposed Action
	<p>avoided. In addition, detailed flight safety analyses are conducted prior to each mission. As a result, no impacts to public or occupational health and safety are anticipated.</p> <p>Each RV test at USAKA would release hazardous and toxic materials (including Be and DU) around the impact point and some distance downwind. For a land impact on Illeginni Island, such debris would occur close to the point of impact. As a result, the major potential health concern is for workers visiting the island, and the long-term management and restoration of the island. However, modeling and post-test sampling results from prior RV flight tests have shown that air sampling levels for contaminants are far below Federal guidelines, and similar to pre-test background levels. Various post-test safety and health procedures are followed. Thus, no significant impacts to either occupational or public health and safety would occur.</p>	health and safety are anticipated.
Hazardous Materials and Waste Management	<p>The limited amount of hazardous materials used for RV test operations would be managed in accordance with well-established policies and procedures. Any residual fragments of RVs (including DU or high explosive materials) would be recovered from land or shallow water areas and properly disposed of in accordance with all UES and DOE/LLNL regulations and requirements. As previous sampling results have shown, levels of Be and DU contaminants in the air at Illeginni Island continue to remain at or near background levels, even after years of testing. Be and DU soil concentrations on the island can exceed background levels in the vicinity of RV impact sites. However, the Be and DU concentrations in the dissolved form are below background levels. In addition, the rates of dilution for Be and DU are significantly greater than their rates of dissolution in water, ensuring that the concentrations would not exceed background levels. Hazardous material and waste handling capacities at USAKA would not be exceeded by RV test operations, and management programs would not have to change. Consequently, no adverse impacts from the management of hazardous materials and waste are expected.</p>	<p>For the Proposed Action, the same policies, procedures, and regulations followed under the No Action Alternative would apply. Hazardous material and waste handling capacities would not be exceeded, and management programs would not have to be changed. Thus, no adverse impacts from the management of hazardous materials and waste are expected.</p>

2.6 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The USAF's preferred alternative is the Proposed Action, as described in Section 2.3 of this EA.